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The Radio Amateur's Journal

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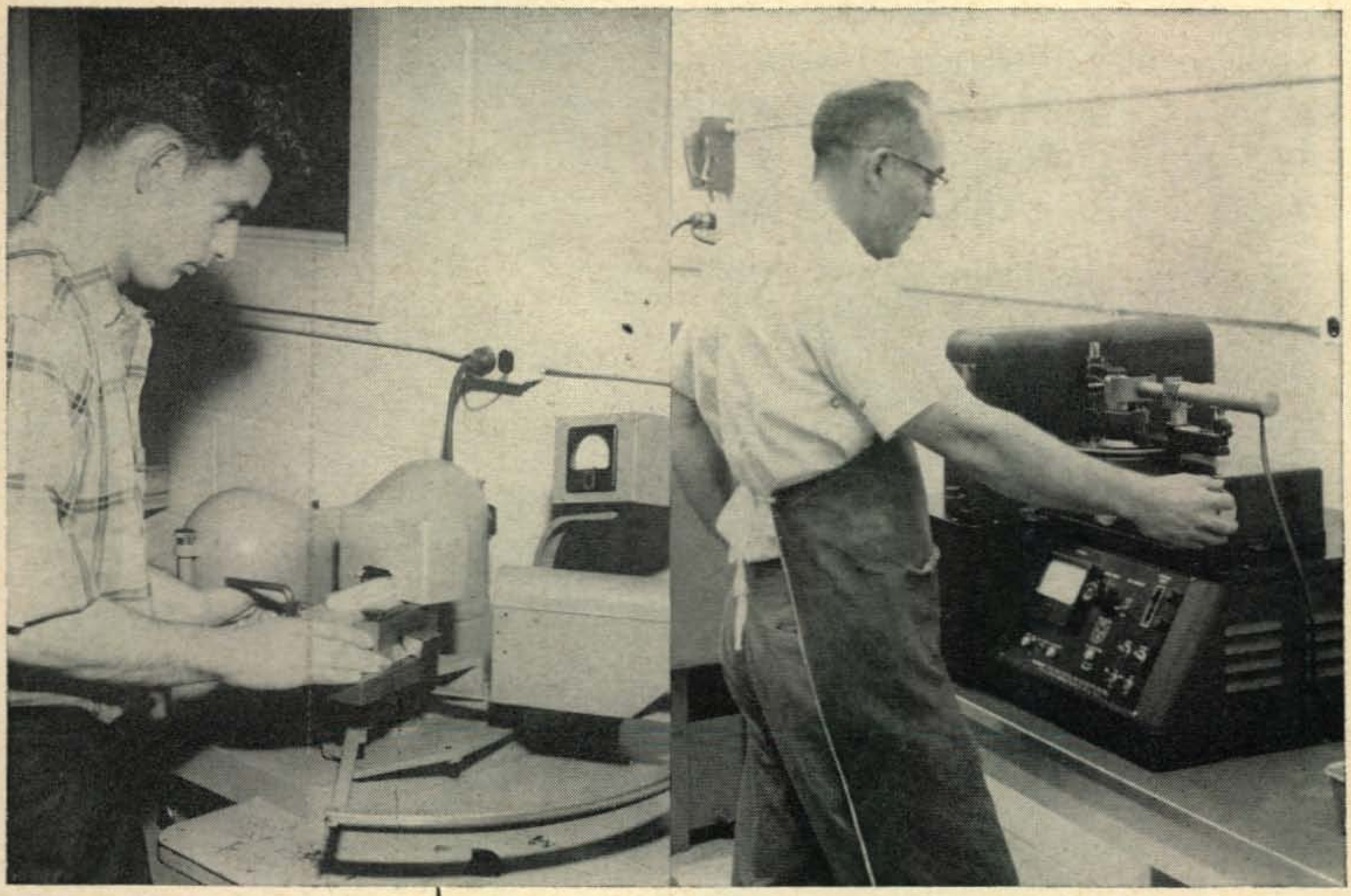

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CQ

The Radio Amateur's Journal

Vol. 19, No. 9 September 1963

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Table of Contents

A Compact Receiver for the C. W. Man.....*E. H. Marriner, W6BLZ* 22

A Stable Transistorized V.F.O.....*Cmdr. Paul H. Lee, W3JHR* 25

160 M. QRP for Medium Power Rigs.....*Harold E. Davis, W8MTI* 27

A Surplus Vidicon TV Camera.....*Martin L. Kaiser, W2VCG* 28

A D.C. Source From the PE-73.....*Alan M. Hansel, KØIQF* 31

Results . . . 1963 Armed Forces Day Communication Tests 33

A V.F.O. Adaptor.....*David T. Geiser, WA2ANU* 34

CQ Reviews: The Workman Model BX 125 Transverter 35

CQ Reviews: The Lil Lulu 6-Meter Transmitter..... 36

CQ Reviews: The Knight-Kit Model LC-1 Code Oscillator 38

IQSY—The International Quiet Sun Year.....*D. R. Hearsum, W8LUZ* 39

A Fully-Manual Time-Sequence Key.....*David T. Geiser, WA2ANU* 41

Name That Thing.....*Raymond De Vos, W2TAM* 42

Diode Power Supply Calculations.....*E. H. Marriner, W6BLZ* 44

Rules: 1963 *CQ* World Wide DX Contest..... 46

The V.H.F. Amateur..... 71

Two Meter Kilowatt..*Bob Heil, K9EID & Gus Budina, K9EBA* 72

The VHF Amateur Reviews: The Clegg Thor 6 Transceiver..... 74

Departments

Announcements 12
Contest Calendar 56
DX 48
Ham Clinic 66
Ham Shop 106
Letters 8
Novice 58
Propagation 52
QSL Contest 16
RTTY 68
Sideband 54
Space Communications 51
USA-CA 62
VHF 60
YL 65
Zero Bias 7

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Maximum power input	500 watts
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Flexible terminal extension	18" of RG-8A/U
Termination	Type N male with Neoprene housing
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Lateral thrust at rated wind	19 lbs. at 150 Mc
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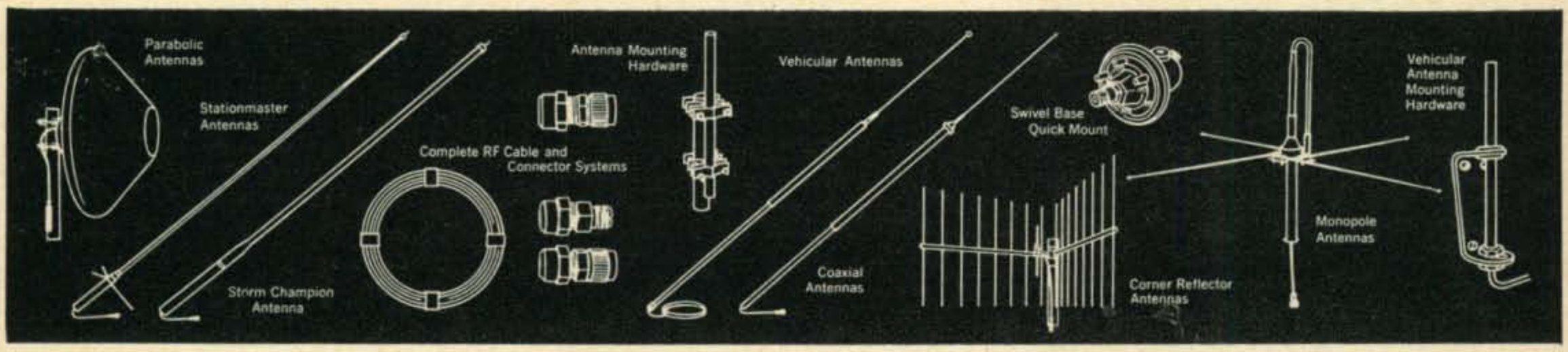

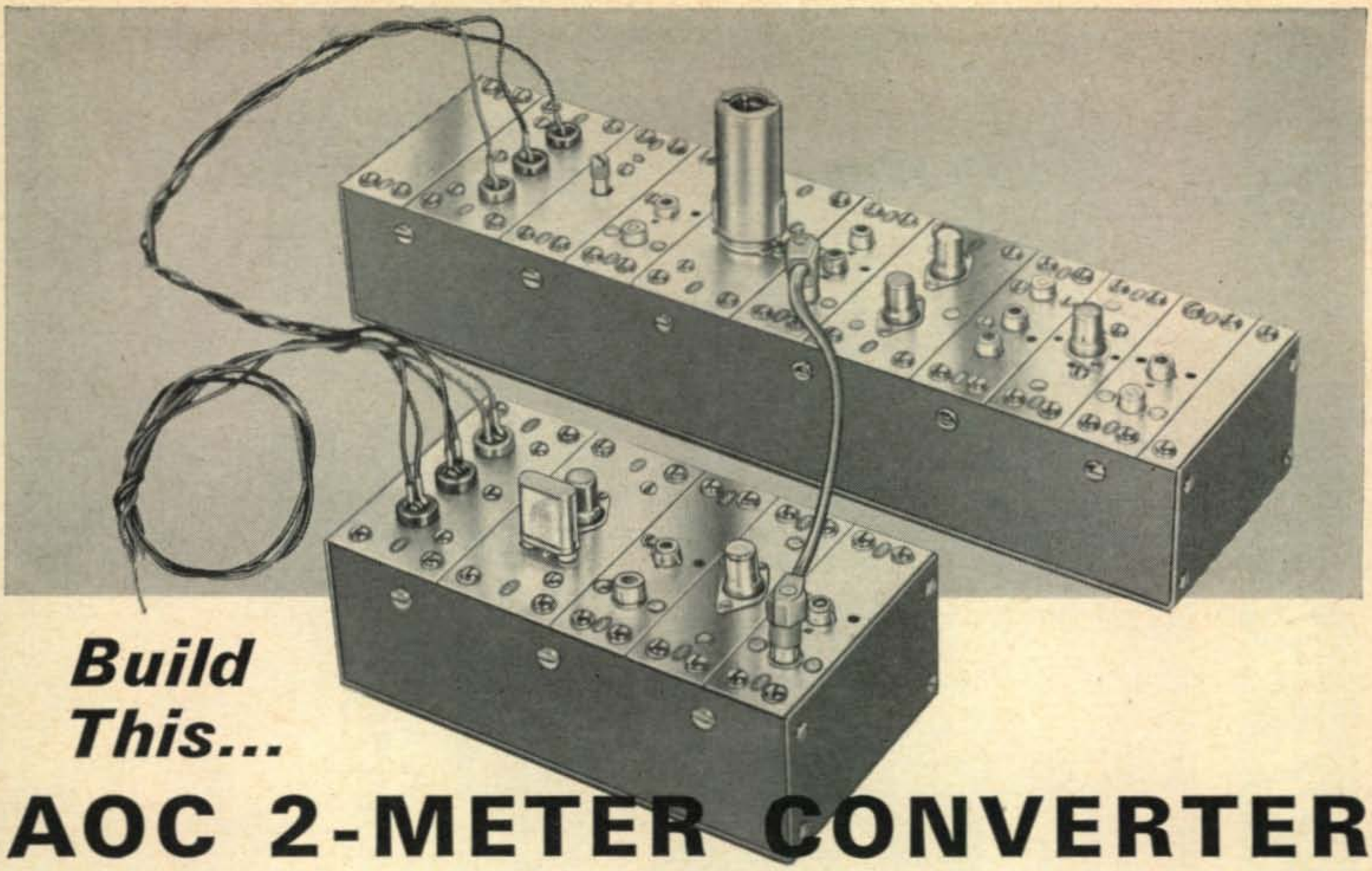

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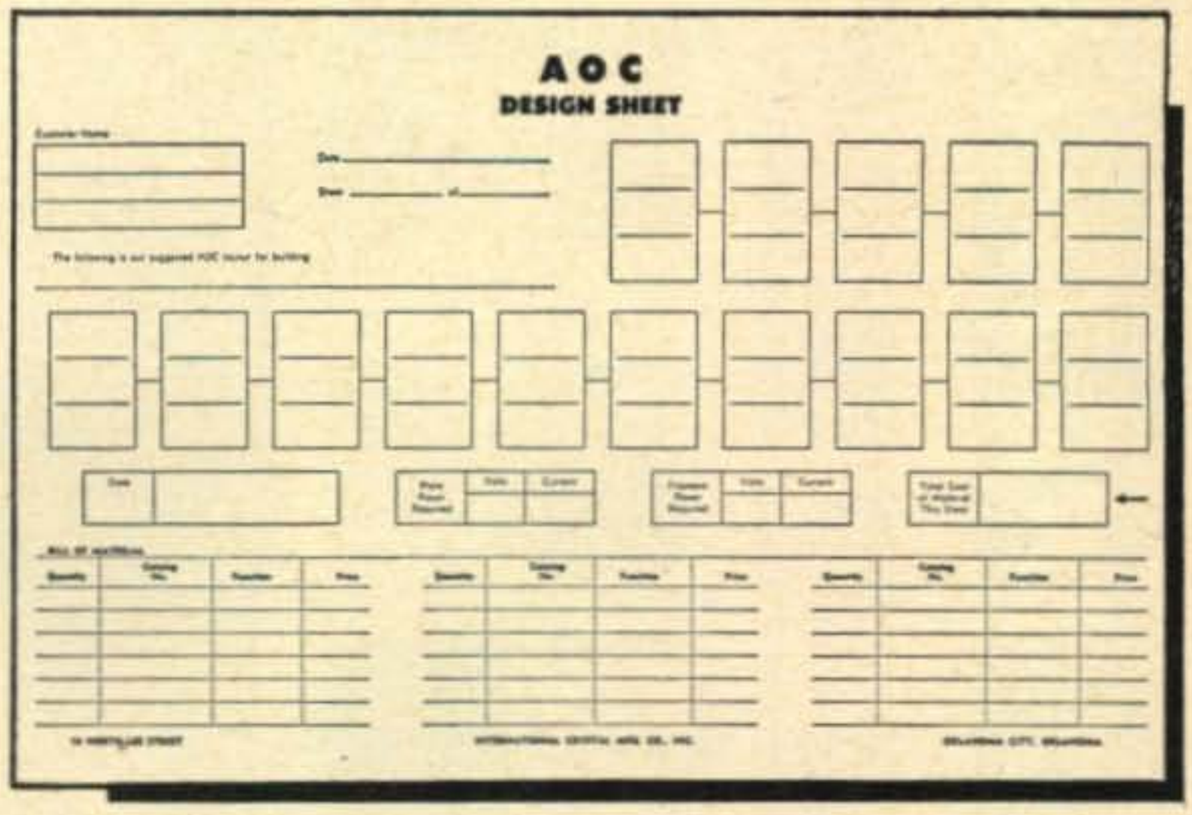

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ASK THE HAM WHO OWNS ONE

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Oceanside, California

ZERO BIAS

IS AMATEUR radio still the hobby it used to be? Does it still rank with stamp collecting, photography, bird watching and model building? Is it still the fun party it was years ago?

We're sure all our readers will agree it used to be, but there's no denying—things have changed! Our precious frequency spectrum is no longer the exclusive domain of the large industrial nation. It can no longer be considered the possession of the highly-populated, wealthy countries. Today, every nation, on every continent seeks to expand its use of industrial, commercial, and propaganda broadcasting. Dozens of newly independent nations, as well as many older countries, eagerly await their chance to make use of frequencies, sadly lacking throughout the world.

No—amateur radio can no longer be considered a hobby. In bygone years when amateur radio bore no frequency occupancy problem, amateur radio was truly a hobby. Today, however, our favorite pastime treads boldly on the valuable tool of world-wide communications.

Consider for a moment what the American ham bands must sound like to a fellow in South America, Africa, or for that matter even as close a neighbor as Mexico. Consider the trivia, the rubbish, the "Ugly American" image we propagate throughout the world. It is this illusion, this caustic picture which casts serious doubts on the retention of our frequencies.

As the Administrative Radio Conference of the International Telecommunications Union convenes in Geneva (probably not before 1965) it is rather unlikely that the delegates from such countries as Ghana, Togo or Indonesia, to name a few, will indicate an enthusiastic desire to vote affirmatively on matters pertaining to amateur frequency allocations. During the next conference some one-hundred and twenty votes will decide the fate of many of our allocation problems. How many affirmative votes do you think will come from countries disinterested in amateur matters? Keep in mind that many of these countries have only one, two or at most a half-dozen hams, while some have no resident licensees at all. Should they vote to allocate three megacycles of valuable spectrum to be used as a toy? Should they support other petitions for the allocation of precious spectrum? Hardly!

Keep in mind that many commercial users of radio pay enormously high fees to their governments for the privilege of placing a transmitter in operation. Many of these countries depend to a great extent on the income derived therefrom. Is it not conceivable, therefore, that these nations would prefer to institute commercial, rather than amateur services?

We in this country should be cognizant and indeed proud that a lobby group such as the ARRL, representing U.S. amateur radio, will do its part in convincing the United States' delegation as well as other delegates that amateur frequencies should be preserved.

To this end lies the basic motive for inauguration of the League's present incentive licensing proposal. It is the hobby aspect of amateur radio which we *must* dismiss, for if our frequencies are to survive (and we assume everyone puts the importance of our spectrum above all other considerations) a stronger reason than occupying our idle time is required.

With incentive licensing the League is now prepared to place amateur radio in a light which will clearly illustrate to all nations, that public interest and necessity far outweigh individual goals.

Incentive licensing is a long term project designed to place amateur radio on a plane far above its present status. We ask a question of those whose operations may be curtailed: Would you rather suffer the inconvenience of a few hours study and another FCC exam, or would you rather suffer the consequences of having no amateur radio at all?

OUR COVER

WE'RE trying something a little different this month! We have the cartoonist's caption and we think it's pretty darn good; but we want to know if you have any ideas. If you think you have a good one send it to "Gags," c/o *CQ*. Deadline is October 10, 1963.

BEGINNING with the November issue, *CQ* will again be mailed to our subscribers with a protective outer wrapper.

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"The Swans of Abbotsbury"

Editor, *CQ*:

Congratulations on printing G3BID's candid and patently sincere article in August, 1963 *CQ*. This provocative article, as your staff so calmly put it, is more than just provocative. A stronger adjective is needed. The truth of Mr. Wagner's article is probably as shocking to some amateurs as was Darwin's Theory of Evolution to dogmatic objectors of the 1800s. I am curious to see how much opposition the article will receive.

The opposition will more than likely come from the mass-produced amateur who has been manufactured on the local radio club's assembly line. Then again, the opposition might stem from the ignorant amateur who cannot foresee the plight our one-time select hobby is destined to meet.

Mr. Wagner's analogy is by no means stretched or far fetched. It is an excellent one, and one which only an intelligent and concerned radio amateur could see. Those amateurs who agree should also agree to a system in which the number of amateur radio operators is kept at a minimum. One way of accomplishing this constant ham population is the institution of an incentive licensing system and amateur tests which are difficult, and in reality, unfair to the common ordinary person. They should be unfair to the ordinary person, because amateur radio operators are not common ordinary people. Let's admit it, we think that we're pretty special, and we are! However, we will not be special if we let every Tom, Dick or Harry get a license. The quantity of amateur radio operators is no criteria for quality.

To the common, apathetic, and pseudo-ham, this select policy sounds snobbish. It may very well be snobbish, but I consider it facing up to reality.

Mr. Wagner's article asked us a question: "What will it be boys, citizen band operators or intelligent, elect radio amateurs?"

Chester Mroz, WA2LDC
Eden, New York

[*Editors Note:* Not so surprising is the fact that from the many letters received on "The Swans of Abbotsbury" before copy deadline, so far, none have voiced opposition.]

R.S.G.B.

Editor, *CQ*:

Thank you, on behalf of the eleven thousand-plus members, for the tasteful cover design of *CQ* for July, conveying congratulations to our Radio Society of Great Britain on its 50 Year Anniversary!

That the R.S.G.B. is not as well-known abroad as it might be was forcibly brought home to me a few years back. A visiting WØ picking out the letters R-S-G-B

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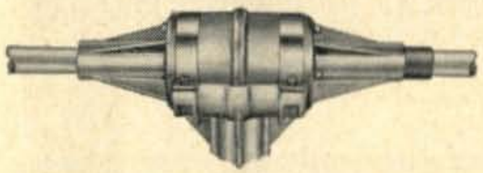

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For further information, check number 12, on page 110

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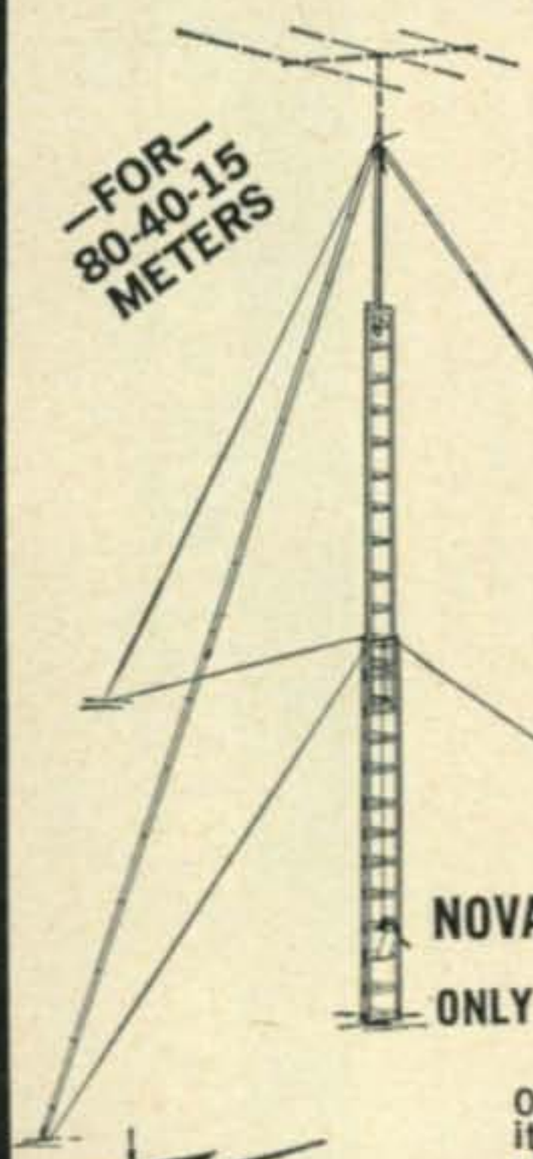

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For further information, check number 24, on page 110

from my conversation enquired: "R-S-G-B. Is that some sort of a Society, or somethin'?"

Readers particularly interested in talking to British amateurs might like to know that the R.S.G.B. publishes annually a *Call Book*, covering G, GC, GD, GI, GM & GW, as well as EI. This publication, running to 69 pages of calls in the 1963 edition, is complete at the time of publication and omits no calls. It can be obtained from the Society at 28 Little Russell Street, London, W.C.1 and is priced at 5 shillings [70¢], postage included.

Your quote concerning "Amateur Radio's first Golden Jubilee on page 7 of July's *CQ* is incorrect. The Wireless Institute of Australia, formed in March, 1910 celebrated their 50th Anniversary in 1960, thereby predating our R.S.G.B. by over three years! In their journal, *Amateur Radio*, dated July, 1935, the W.I.A. is quoted as being" . . . the world's oldest Amateur body . . ."

F. Allan Herridge, G3IDG
96, George Street,
Basingstoke, Hampshire

Our apologies to the Wireless Institute of Australia for overlooking the first amateur Golden Jubilee. Since it is not likely that American amateurs are familiar with the W.I.A., we reproduce below their official insignia.

They also publish *Amateur Radio* monthly which may be obtained by subscription via P.O.Box 36, East Melbourne, C2, Victoria, Australia—*Editor*.

For . . . .

Editor, *CQ*:

Congratulations on an excellent ZERO BIAS editorial in the August *CQ*! Qualified by fifteen years of hamming, I am convinced that *CQ* is interested in the long range betterment of amateur radio.

C. LaMar Ray, KIRTB
13 Sherman Street
Nashua, New Hampshire

Editor, *CQ*:

Accept my congratulations on the sensible editorial in the August issue of *CQ*. I refer to your summary of former licensing procedure and to the last two paragraphs of ZERO BIAS. I fear that an obstinate minority of hams have seized upon the ARRL incentive licensing and restricted phone band proposals as a means to express their imaginary grievances against the only group that can be credited with permitting us to enjoy ham radio as we know it today.

Some letters from readers (July, *CQ*) indicate immature analysis of the problem, if one exists. ARRL specifically requested that members should comment to their Division Director on the incentive licensing proposal prior to the board meeting. Personally I favor incentive licensing and restricted phone bands, and so advised my Division Director. Many of my friends did likewise. Quite apparently the opposition were not sufficiently interested to take action to permit their views to be considered. Certain people are always ready to criticize action after it is taken, but will never raise a voice in protest or approbation at the proper time.

Again, I am glad to see the position *CQ* has taken and do not consider it a "me too" attitude. That is only a phrase coined by the uninformed who have no logical complaint. . . .

Gilbert L. Countryman, W4JA
75 East Bay Street
Charleston, S.C.

Editor, *CQ*:

After reading your August editorial, I could not resist writing immediately to thank you and congratulate you on the good sense and real regard for the future of our hobby, that it shows.

Other magazines, and even previous editors of *CQ* have, I know, allowed themselves to be swayed by transient emotions puffed up by a minority of selfish or ignorant hams. I am glad to see the cooperative and understanding approach you have now taken!

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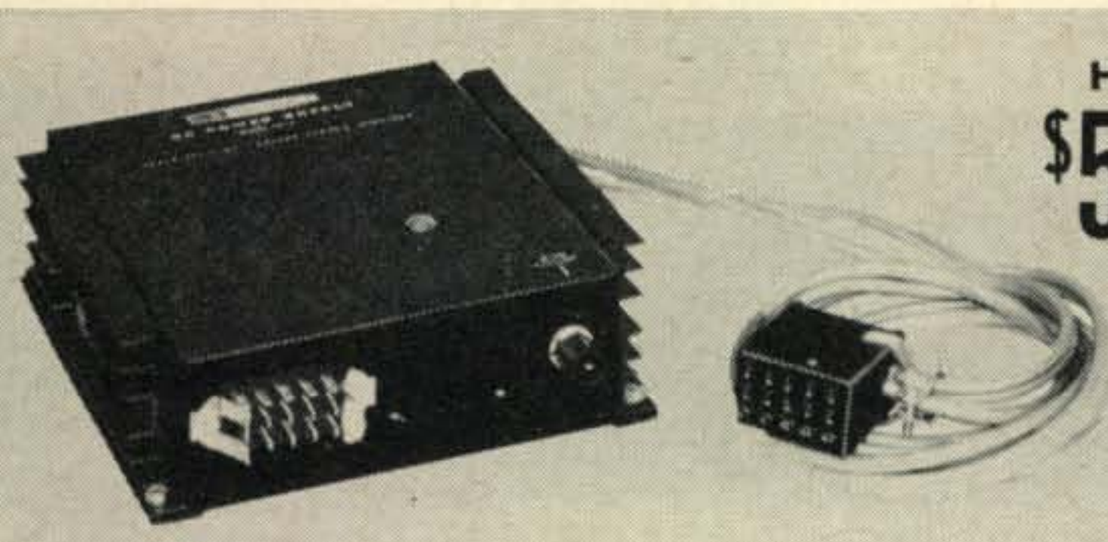
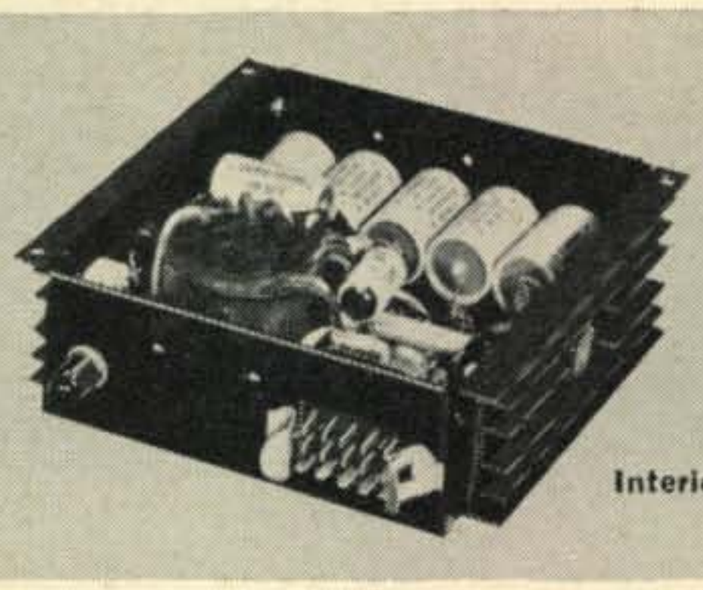


HP-13

$59.95

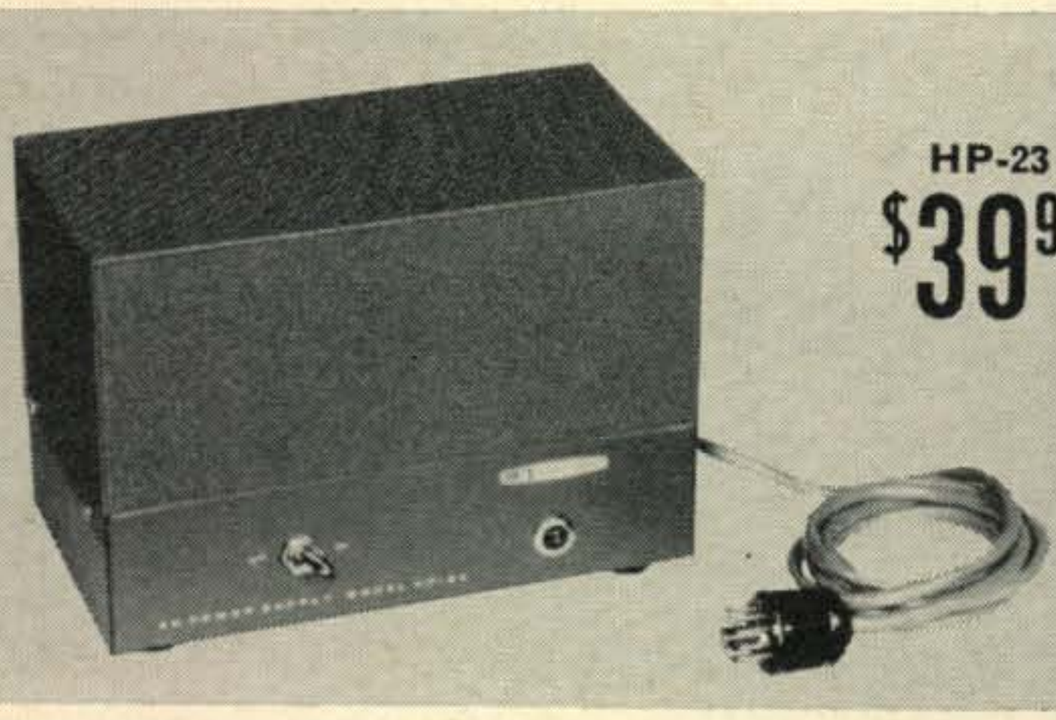


Interior

NEW DC "MOBILE" POWER SUPPLY: Furnishes all power required by Heathkit and other makes of SSB transceivers and mobile gear. Features encapsulated high-efficiency "Deltamax-core" toroidal transformer, power switching transistors, silicon rectifiers, circuit breaker protection, and relay control of primary power. 1500 cps switching frequency for low ripple output, excellent dynamic regulation.

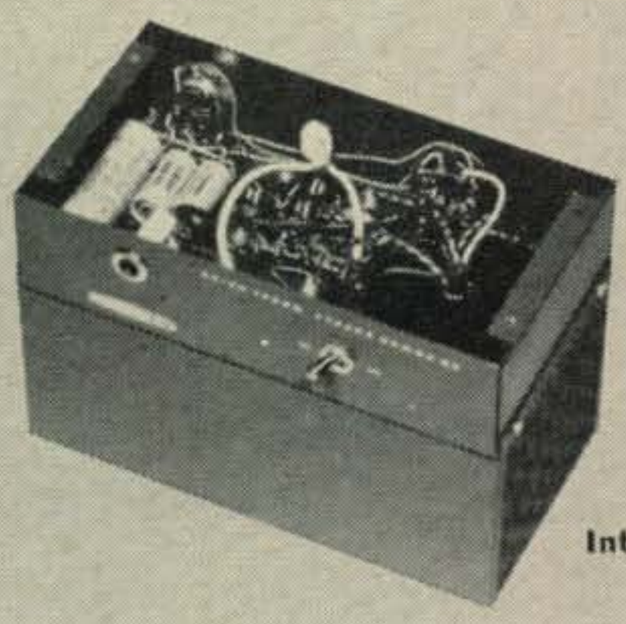
Kit HP-13...7 lbs....no money down...$6 mo.....**$59.95**

SPECIFICATIONS—Input voltage: 12 to 14 volts DC. **Input current:** 25 amperes maximum with full load. **High voltage output:** 800 volts DC, no load; 750 volts DC @ 250 ma. AC ripple, less than 1% @ 250 ma; Duty Cycle, 150 ma continuous; 150 to 300 ma @ 50%. **Low voltage output:** (high tap) 310 volts DC, no load; 300 volts DC @ 150 ma. (low tap) 265 volts DC, no load; 250 volts DC @ 150 ma. AC ripple, less than .05% @ 150 ma. Continuous duty cycle, to 175 ma. **Adjustable bias voltage:** —40 to —130 volts DC @ 20 ma max. Duty cycle, continuous. **Dimensions:** 7⅜" W x 7½" L x 2⅜" D. All voltages referenced at 13 VDC input.



HP-23

$39.95



Interior

NEW AC POWER SUPPLY: Converts mobile gear to fixed-station operation in minutes. Furnishes HV, LV, bias, and filament power. Excellent dynamic regulation and extremely low AC ripple for optimum performance. Features long-life silicon rectifiers, provision for remote switching and fused line plug. Complete instructions for use with Heathkit and other SSB gear.

Kit HP-23...18 lbs....no money down, $5 mo.....**$39.95**

SPECIFICATIONS—Power requirements: 120 volts AC, 50-60 cycles, 350 watts maximum. **High voltage output:** 820 volts DC, no load; 700 volts DC @ 250 ma. **AC ripple:** Less than 1% @ 250 ma. **Duty cycle:** 150 ma continuous, 150 ma to 300 ma @ 50%. **Low voltage output:** (High Tap) 350 volts DC, no load; 300 volts DC @ 150 ma. (Low Tap) 275 volts DC, no load; 250 volts DC @ 100 ma. Less than .05% AC ripple @ 150 ma, continuous duty to 175 ma. **Fixed bias:** —130 volts DC, no load; —100 volts DC @ 30 ma. **Adjustable bias:** —40 to —80 volts DC @ 1 ma maximum. Less than .5% AC ripple. Continuous duty to 20 ma. **Filament voltage:** 6.3 V. AC @ 11 amps; 12.6 V. AC @ 5.5 amps. **Dimensions:** 9" L x 4¾" W x 8¾" H.

HEATHKIT® by Daystrom

FREE CATALOG

Send for your copy today! Fully illustrates over 250 different kits at savings of 50% or more! Choose from the world's biggest selection of quality ham gear . . . "Mobile" . . . "Fixed" . . . and Accessories!

HEATH COMPANY, BENTON HARBOR 12, MICHIGAN

- ☐ Enclosed is $39.95 plus postage; please send HP-23 AC Power Supply
- ☐ Enclosed is $59.95 plus postage; please send HP-13 DC Power Supply
- ☐ Please send me free Heathkit catalog.

NAME

(Please print)

ADDRESS

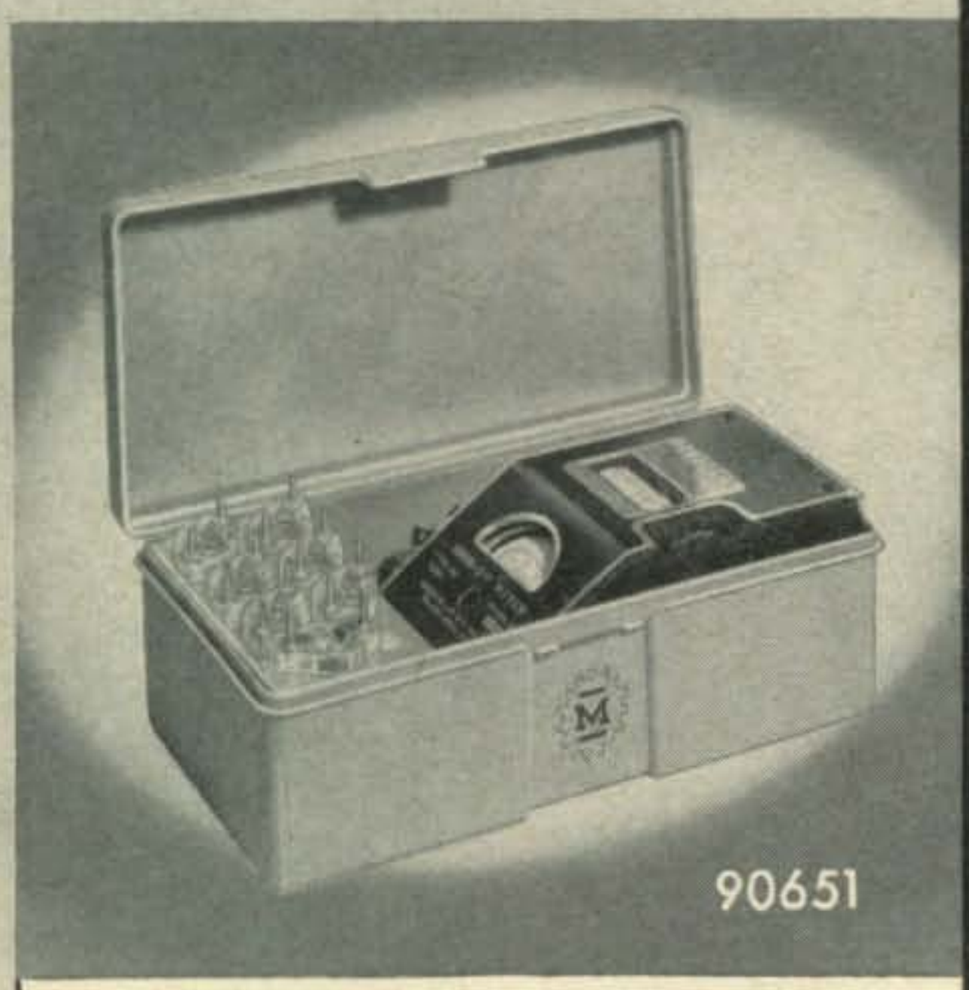
CITY ZONE STATE

Prices & specifications subject to change without notice. Export prices slightly higher.

For further information, check number 3, on page 110

Designed for

Application



90651

The No. 90651

GRID DIP METER

The No. 90651 MILLEN GRID DIP METER is compact and completely self contained. The AC power supply is of the "transformer" type. The drum dial has seven calibrated uniform length scales from 1.5 MC to 300 MC plus an arbitrary scale for use with the 4 additional inductors available to extend the range to 220 kc. Internal terminal strip permits battery operation for antenna measurement.

JAMES MILLEN MFG. CO., INC.

MAIN OFFICE AND FACTORY

MALDEN

MASSACHUSETTS

My acquaintance with your publication and its predecessors: *Radio* and *Pacific Radio News* goes back to 1919. It has always been an independent, relaxed magazine and that is nice for a contrast.

Fred J. Elser, Col. USA-Ret., W6FB
1189 Tamarisk Road
Palm Springs, California

. . . . and Against

Editor, *CQ*:

We feel very sad and angry after reading your ZERO BIAS in the August issue of *CQ* . . .

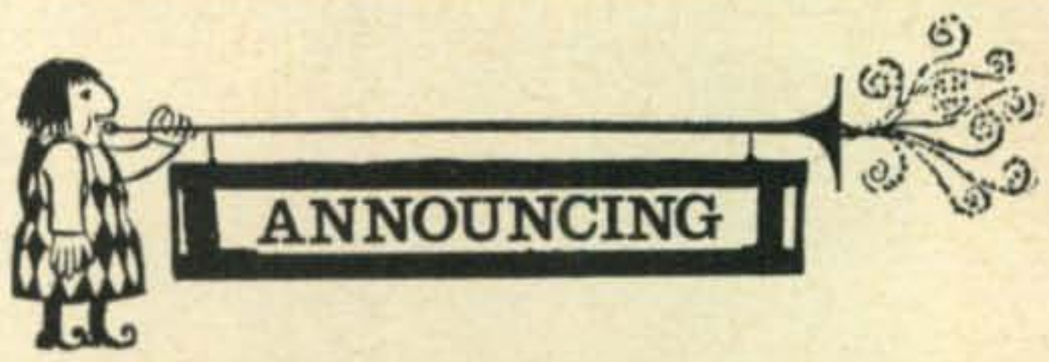
. . . Are you afraid of the alleged powers of the ARRL? Is it because you may have too many old "Class-A's" on your staff? If this is true then "File 13," gets this letter. We Generals and our Class-A friends then know where we stand.

. . . Your quote: "The Class-A Amateur became 'advanced' on paper only, since the examination was no longer administered, should have said that the scope of the exam for the General licensee was *upgraded* with Class-A questions and has been upgraded every year since then, by the F.C.C.

. . . If you check the facts and you want to be honest and fair, you will have to admit that the General licensee received his upgrading and has earned the right to operate all bands with no exception.

If you have no ulterior motive, as you say, and you want to be fair to the majority of your readers (the General licensees) you should make amends for the lack of concept and for the omission of the upgrading of the general licensee by presenting the facts in their entirety. Please do not underestimate the wrath of the General licensee and many of their Class A relatives and friends, who are with them in the fight against this grab for the benefit of the Horse and Buggy operator of "Ye Olden Days."

Lou and Alice Brummel, K2BEJ/K2ETC
63 St. Johns Avenue
Yonkers, N. Y.



Pacific Voyage

You guys with your "all band" receivers may be able to do a great service for Bill Willis who left Peru on a raft, July 4th for a month "sail" of the Humboldt current. Bill is 70 years old, alone, and is using a hand-powered transceiver. C.w. reports will be made on 8364 kc, 2-3 hours after dark and 2 or 3 hours before sunrise. He's using the call *Salvita Three* and any information should be reported immediately to R. C. Griffiths, c/o Marconi Marine Division, 75 West Street, New York 6, N.Y.

New Jersey

Bill A-647, recently introduced at the New Jersey General Assembly has a chance of obtaining call-letter plates for hams of that State. All New Jersey amateurs are urged to write or phone their representative indicating their approval of the bill.

New Rochelle, N.Y.

The Communications Club of New Rochelle will begin its eighth year of classes leading to the Novice, Technician and General License. A code class will also be offered. Dates for registration are Sept. 12, 16 and 17, by mail or in person. Contact Charles Blake, Director, CCNR, P. O. Box 971, New Rochelle, N.Y. Phone —914 632-9000.

Syracuse

The Syracuse V.H.F. Roundup will be held on Oct. 12, at the 3 Rivers Inn, Rt. 57, ten miles north of Syracuse, N.Y. Registration starts at noon and tickets may be obtained from K2BYU, 405 Edgerton, Minoa,

For further information, check number 32, on page 110

WHAT'S MISSING IN THIS PICTURE ?

Missing—the inevitable operating restrictions found in present-day "No-Knob" amateur equipment.

Hammarlund does not subscribe to the current theory that Amateur Radio Equipment must be "compact"—with minimum and over-simplified operating controls. Equipment of this type is self-limiting—and therefore imposes severe restrictions on the amateur who wants to be in control—and obtain the best possible performance under infinitely varied operating conditions. For example, the "pro" might reinsert the carrier off-center on SSB in order to dodge QRM. (Try to do **this** on a "no-knob" receiver).

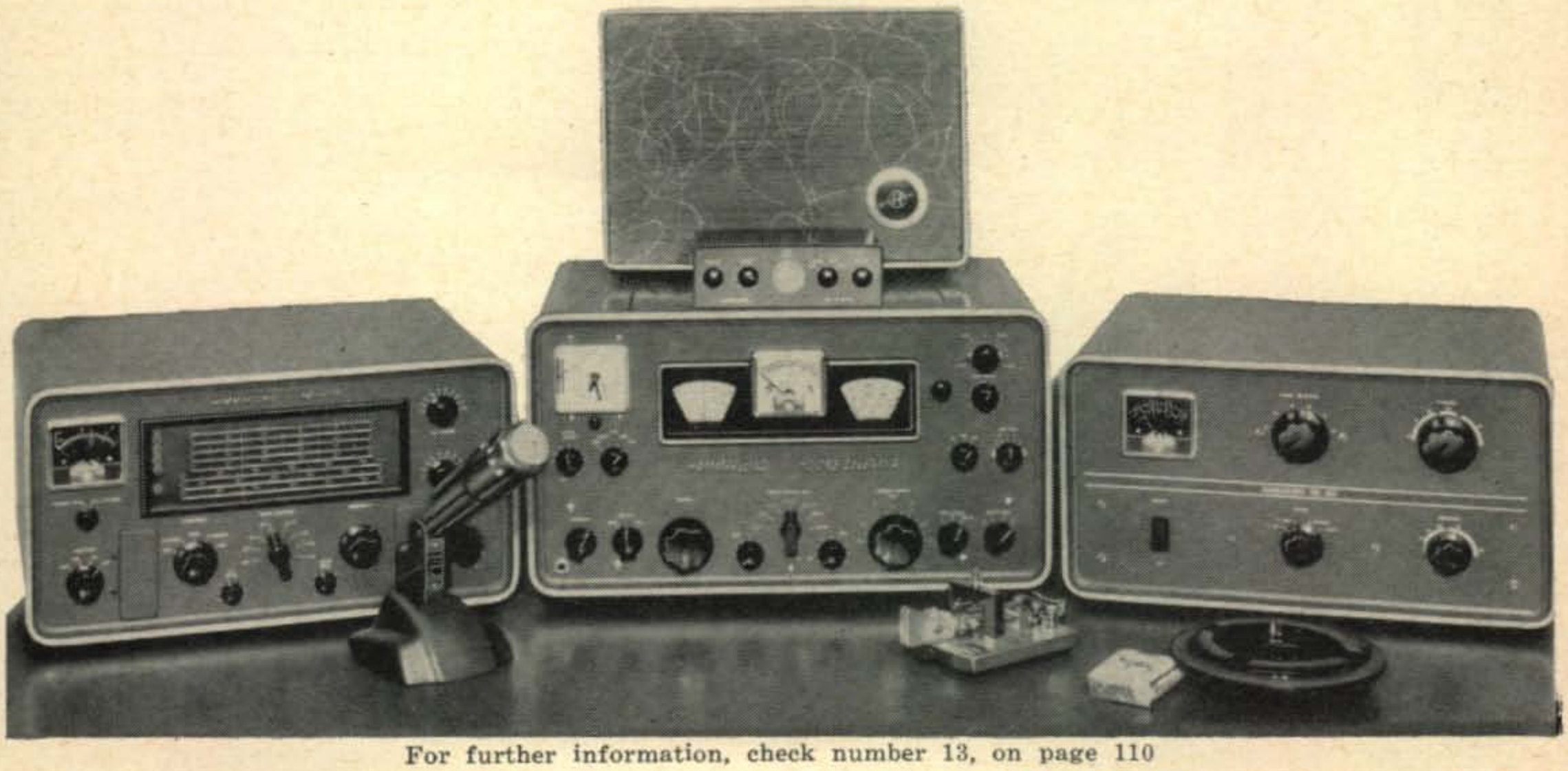
Hammarlund communications receivers contain the control functions that can spell the difference between mediocre and excellent. These include: ■ Variable selectivity regardless of operating mode ■ Fast AVC attack—adjustable decay ■ Individually controlled noise limiter and (optional) IF noise silencer ■ Direct reading frequency calibration . . . just to name a few.

Compromises are missing with Hammarlund equipment. We design and manufacture amateur radio equipment that the novice can grow with—and the expert will enjoy.

Why buy built-in obsolescence?

HAMMARLUND
MANUFACTURING COMPANY
A GIANNINI SCIENTIFIC COMPANY
53 West 23rd Street, New York 10, New York

All-Hammarlund station including the versatile HX-50 SSB exciter, the new HQ-170A receiver which has earned an envied and enviable reputation as the **Amateur Band Specialist,** and the "Instant-On" HXL-1 Linear Amplifier for booming 1500 watt P.E.P. performance.



For further information, check number 13, on page 110

$99.95 wired

SIDEBAND AM CW
140 watts
Double Side Band

WORLD RADIO LABORATORIES
3415 West Broadway, Council Bluffs, Iowa

WRL METEOR SB-175 TRANSMITTER

Another outstanding WRL value. Sold on a "Factory To You Basis" means another outstanding savings to you. The powerful Meteor SB-175 is factory wired—ready to operate for only $99.95 (less power supply). Try it for 2 weeks, at our risk. Ideal for the Novice (75-watt setting) or Advanced Operators. Handsome and rugged. One knob band switching 80-10 meters. Fixed or Mobile. Provisions for crystal or VFO. Compact, 5" high x 11⅞" wide x 8" deep, wt. 10 lbs. W.R.L. Power Supply—PSA 63—$24.95 Kit, $39.95 Wired. Intra-connecting Cable $1.75, P.L. 68 Mike Plug 99¢.

You must be 100% satisfied or return postpaid for full refund.

WRL – the home of the Famous Galaxy 300.

TWO-WEEK TRIAL - $ MONEY BACK GUARANTEE

SIDEBAND AM CW
100 watts
Double Side Band

WORLD RADIO LABORATORIES
3415 West Broadway, Council Bluffs, Iowa

WRL METEOR SB-175 TRANSMITTER

Another outstanding WRL value. Sold on a "Factory To You Basis" means another outstanding savings to you. The powerful Meteor SB-175 is factory wired—ready to operate for only $99.95 (less power supply). Try it for 2 weeks, at our risk. Ideal for the Novice (75-watt setting) or Advanced Operators. Handsome and rugged. One knob band switching 80-10 meters. Fixed or Mobile. Provisions for crystal or VFO. Compact, 5" high x 11⅞" wide x 8" deep, wt. 10 lbs. W.R.L. Power Supply—PSA 63—$24.95 Kit, $39.95 Wired. Intra-connecting Cable $1.75, P.L. 68 Mike Plug 99¢.

You must be 100% satisfied or return postpaid for full refund.

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SIDEBAND AM CW
140 watts
Double Side Band

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You must be 100% satisfied or return postpaid for full refund.

WRL – the home of the Famous Galaxy 300.

TWO-WEEK TRIAL - $ MONEY BACK GUARANTEE

For further information, check number 33, on page 110

N.Y. Price, $6.00. W2RHQ, W2IYR and K2TXX will also pass along any info.

Indiana

The Hoosier Hills Ham Club, Inc. with headquarters in Bedford, Indiana will sponsor their annual hamfest, to be held at Spring Mill State Park, Mitchell, Indiana. The date is October 13th, and plenty of activities will be on hand to keep the party going. Registration is 50¢ and it goes to Box 484, Bedford, Indiana.

San Francisco

The Greater Bay Area Hamfest, sponsored by seven leading clubs in the San Francisco area will be held at the Edgewater Inn, 77th Ave. and Nimitz Freeway, Oakland, California. The dates are Sept. 21 and 22 and registration is $6.50 which includes Sunday banquet. For pre-registration and information write the Greater Bay Area Hamfest, Box 3791, Rincon Annex, San Francisco 19, California. Letters must be postmarked by midnight, Sept. 15 to be eligible for the pre-registration prize.

The North California Amateur Radio Teletype Society will have a fine demonstration of a projection printer, and will be on hand to answer questions about RTTY.

Cincinnati

The 26th Annual Stag Hamfest sponsored by The Greater Cincinnati Amateur Radio Association, Inc. will be held all day Sunday, Sept. 22 at Strickers Grove, next to the Mt. Healthy Drive-In, Compton Rd., Mt. Healthy, Cincinnati, Ohio. For information contact W8ALW, 3965 Harmar Ct., Cincinnati.

York County, Pa.

The 8th Annual York County Hamfest will be held Sunday, Sept. 1, rain or shine, at the Adams County Fair Grounds, Abbotstown, Pa. Registration is $1.50, XYLs and jr. ops. free. Refreshments will be available and plenty of prizes will be given away. Dan Webster, K3BKH, 235 North 3rd St., Columbia, Pa. will send you more information.

South Jersey

The South Jersey Radio Association will sponsor its annual gala hamfest September 8, 1963, at Molia Farms, Malaga, New Jersey. Rain data will be held on October 6th. Advance registration for non-club members is $1.50. General admission at the gate, $2.00. Day's activities will include 2 and 6 meter transmitter hunt, swap shop, OM, XYL and Harmonics door prizes. For Mobiles there will be talk in by K2AA on 2, 6 and 10 meters. All are invited to bring their lunch baskets, swapping gear and enjoy a day of fun and excitement.

Texas

The Houston-Harris County Hamfest is scheduled for October 19-20 at Sinclair Park, Houston. W5DPA will "talk-in" stations on 3855 kc. W5ZPD will fill in on directions, *etc.* QTH, 3518 Dalstrom, Houston, Texas.

San Diego, California

The Southwestern Division ARRL convention will be held at the Conference Building in Balboa Park on October 11-13. The event is sponsored by the San Diego Council of amateur radio organizations. Their address is P.O. Box 6132, San Diego, California.

Missouri

Members of the Zero-Beaters A.R.C. of Washington, Missouri will erect a Rhombic for experimental purposes on Sunday, Sept. 15th. WAØFYA/Ø will be used on 15 and 20.

Lend An Ear Day

The Society of Radio Operators in Chicago will hold an open house on Oct. 12, 1963 at the Edgebrook Field House, 6100 McClellan Ave., Chicago, Ill. The purpose of the day is to receive contributions to provide the hard-of-hearing with transistor radios and ear plugs. If you can't make it on Oct. 12, contributions may be addressed c/o A. W. Rutherford, 729 N. Delphia Ave., Park Ridge, Ill.

World Scout Bureau

VE3WSB in Ottawa will be on the air Oct. 19 and 20 as part of the 6th International Scouting Jamboree-

[*Continued on page 84*]

1st Choice Among Nation's Amateurs!

Matched Pair

Outstanding performance on SSB, AM and CW with absolutely no compromise on any mode!

"SSB ADAPTER"—The new filter-type SSB generator—with bandswitching 80 through 10 meters . . . more than 50 db sideband suppression . . . more than 45 db carrier suppression! When used with the Viking "Valiant" or "Valiant II" it places 275 watts P.E.P. at your command. Two compact units and interconnecting cables . . . RF unit is only 8" wide—may be placed on your operating desk. Power supply unit may be placed in any convenient location. Features built-in multiplier requiring VFO input only—band-pass interstage couplers require no tuning—design and front panel make operating practically foolproof. Superb audio fidelity and balanced audio response; excellent sideband, spurious and carrier suppression. Other features: positive VOX and anti-trip circuits with built-in anti-trip matching transformer and adjustable VOX time delay. With remote power supply, tubes and crystal filter, less microphone.

Cat. No. 240-305-2—Wired, tested.....Net $369.50

"VALIANT II"—Outstanding flexibility and performance—bandswitching 160 through 10 meters—delivers 275 watts input CW or SSB (with auxiliary SSB exciter or Viking SSB adapter) and 200 watts AM! Low level audio clipping—differentially temperature compensated VFO provides stability necessary for SSB operation! High efficiency pi-network tank circuit—final tank coil silver-plated. Other features: TVI suppression; time sequence (grid block) keying; high gain push-to-talk audio built-in low pass audio filter; self-contained power supply; and single control mode switching. As an exciter drives any popular kilowatt level tubes and provides quality speech driver system for high power modulators. Provision for plug-in SSB operation with no internal modification. With tubes, less crystals.

Cat. No. 240-105-1—Kit.....Net $375.00

Cat. No. 240-105-2—Wired, tested.....Net $495.00

INVADER—More exclusive features than any other Transmitter/Exciter on the market today! Specially developed high frequency, symmetrical, multi-section band-pass crystal filter for more than 60 db sideband suppression—more than 55 db carrier suppression! Instant bandswitching 80 through 10 meters—no extra crystals to buy—no realigning necessary. Delivers a solid 200 watts CW input: 200 watts P.E.P. SSB input; 90 watts input on AM! (25-30 watts output—upper sideband and carrier). Built-in VFO—exclusive RF controlled audio AGC and ALC (limiter type) provide greater average speech VOX and anti-trip circuits. Fully TVI suppressed. Self-contained heavy-duty power supply. With tubes and crystals.

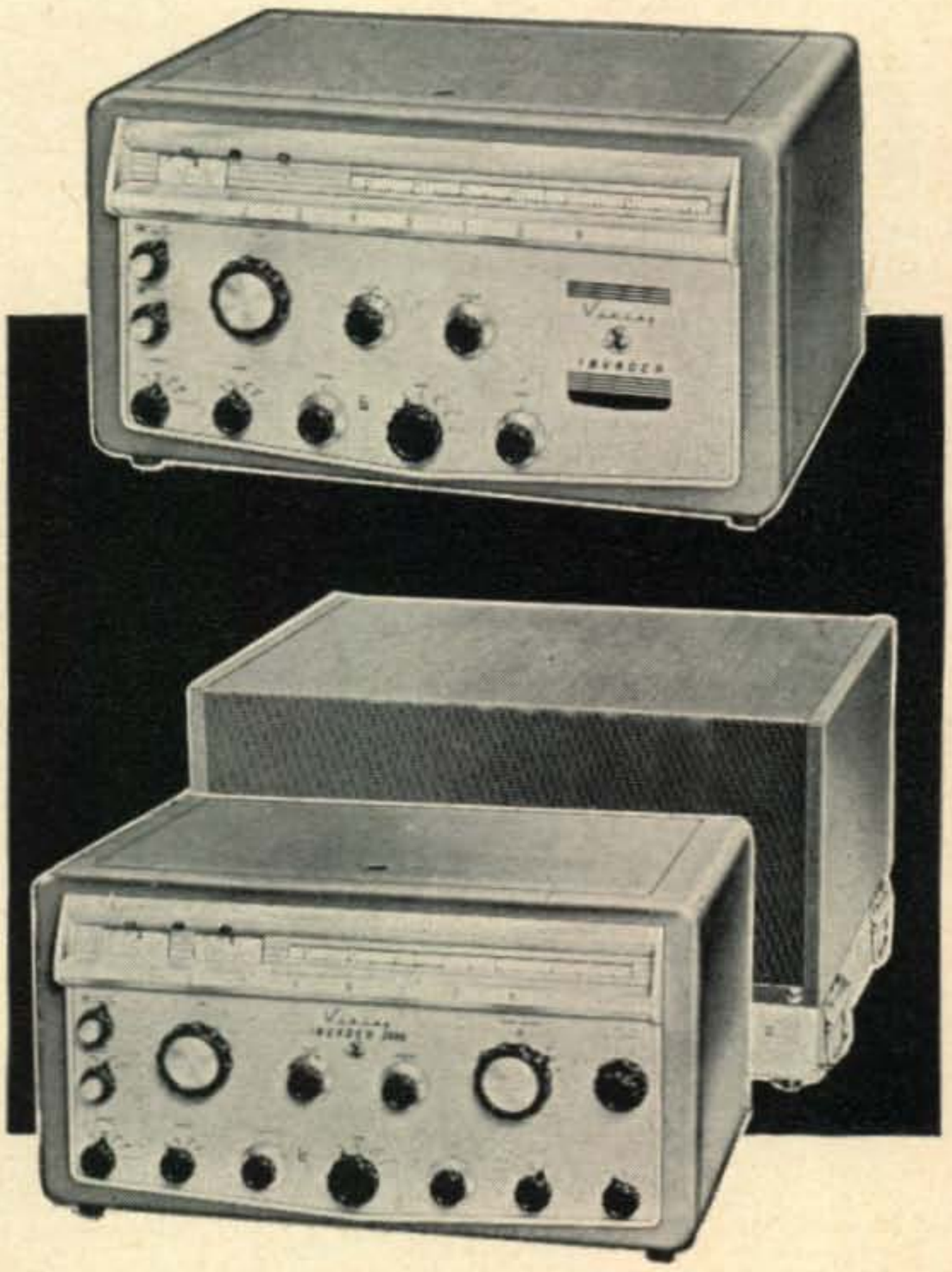
Cat. No. 240-302-2 Wired, tested.....Net $619.50

INVADER 2000—Here are all of the fine features of the "Invader", plus the added power and flexibility of an integral linear amplifier and remote controlled power supply. Rated at a solid 2000 watts P.E.P. SSB, 1000 watts CW, and 800 watts AM! (250 to 300 watts output—upper sideband and carrier.) Wide range output circuit (40 to 600 ohms adjustable). Final amplifier provides exceptionally uniform "Q". Exclusive "push-pull" cooling system. Heavy-duty multi-section power supply. With power supply, tubes and crystals.

Cat. No. 240-304-2 Wired, tested.....Net $1229.00

HIGH POWER CONVERSION—Take the features and performance of your "Invader" . . . add the power and flexibility of this unique Viking "Hi-Power Conversion" system . . . and you're "on the air" with the "Invader 2000". Wired, tested, includes everything you need—no soldering necessary—complete conversion in one evening.

Cat. No. 240-303-2.....Net $619.50



E. F. JOHNSON COMPANY
WASECA, MINNESOTA, U.S.A.

For further information, check number 4, on page 110

TURNER
MICROPHONES . . . BEST FOR MOBILE AND BASE

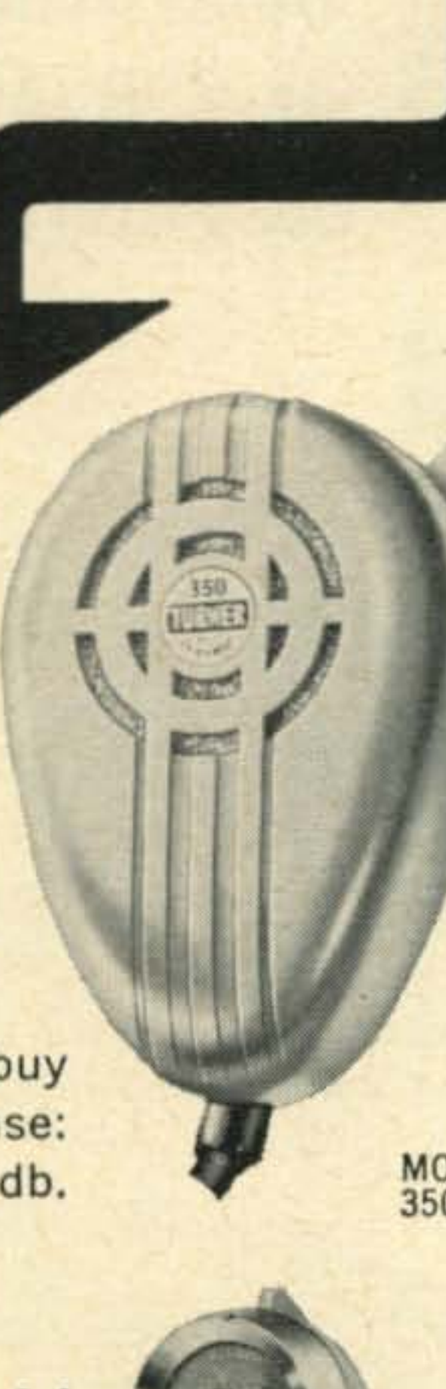
GOING . . .

Convenient, top-performing, low-priced Model 350C from Turner. Rugged, dependable mobile mike . . . world's most popular. Why pay more . . . only $16.80 list . . . buy the Turner 350C. Response: 80-7000 cps. Level: —54 db.

MODEL 350C

OR SITTING STILL . . .

A low-cost crystal microphone with on-off push-to-talk and lock switch. A perfect mike for the ham shack. Cable is 7 foot, three conductor (one shielded), wired for relay operation. Response: 80-7000 cps. Level: —48 db. List price $23.50.



MODEL 254X

SEE YOUR DEALER OR WRITE FOR COMPLETE SPECIFICATIONS

THE TURNER MICROPHONE COMPANY
925 17th Street N.E.,
Cedar Rapids, Iowa

IN CANADA:
Tri-Tel Associates, Ltd.,
81 Sheppard Avenue West,
Willowdale, Ontario

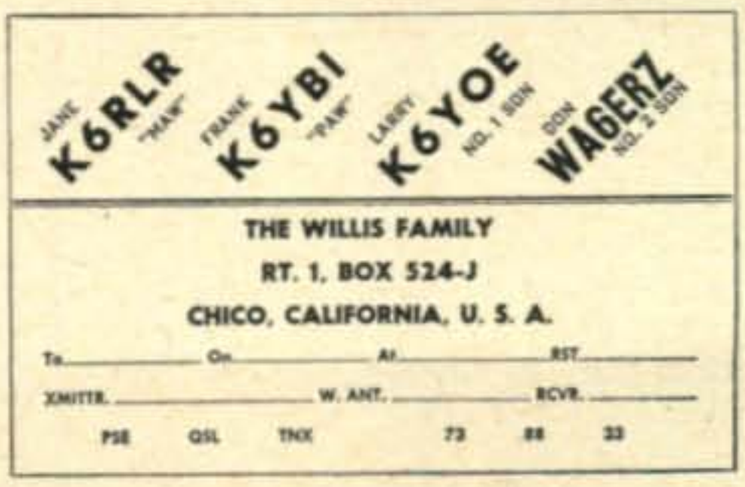
For further information, check number 34, on page 110

QSL contest

OUR request for four-call cards brought in quite a few, some of which are pictured here. The winner is a quartet from down South-America way, consisting of three brothers, CX3AAV, YV5BIG, BNY, and the XYL of YV5BNY, YV5BNZ. The cards, all different colors, were designed by Raul, YV5BIG.

Doc, K7DMB, another "Four Corner" vacationer, makes the trip every year around July 4th. He wonders if anyone would be interested in planning for next year's trip. Write: Doc Altis, 5424 W. Gardenia, Glendale, Arizona.

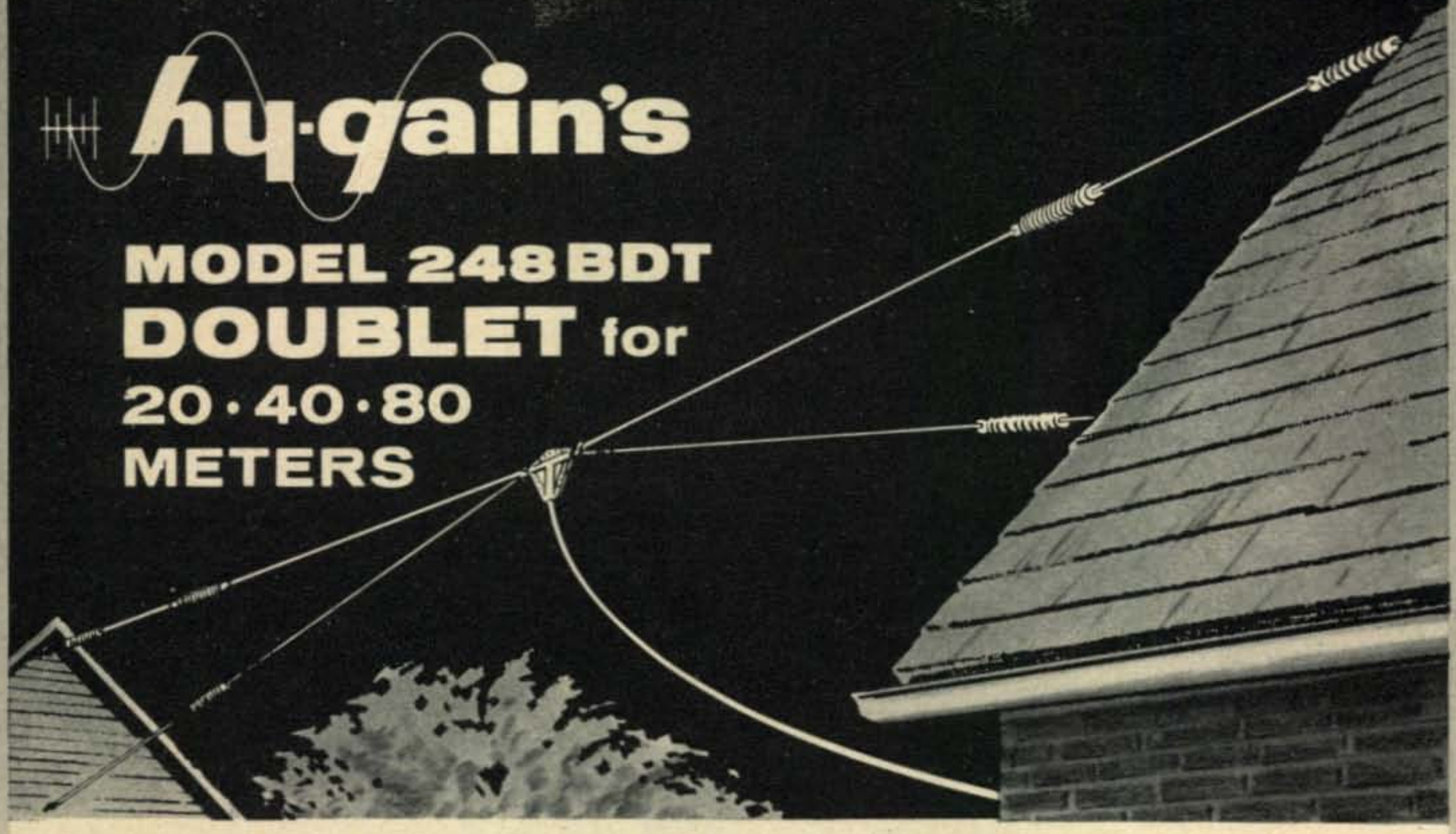
Runners Up



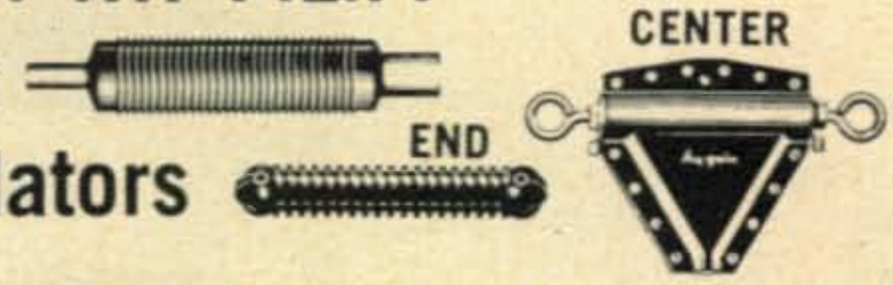
Introducing A NEW MEMBER of a World-Famous Family

hy-gain's

MODEL 248BDT DOUBLET for 20·40·80 METERS



Takes up to 500 Watts AM; 1 KW P.E.P.
Slim Line Solid State Traps
Strong, Weatherproof Insulators



Keeping pace with the popular new 3-band transceivers for 20, 40 and 80 meters is Hy-Gain's Model 248BDT Doublet antenna which was designed expressly to give you unparalleled doublet performance on 20, 40 and 80 meters. You can install the 248BDT horizontally or as an inverted V and be assured it will deliver true half wave performance on every design frequency.

The 248BDT features a matched set of Hy-Gain's Slim Line Solid State traps that have earned user acclaim through daily use in tens of thousands of installations throughout the world. The 248BDT also features Hy-Gain's ruggedly constructed weatherproof center and end insulators which are molded from high impact cycolac plastic. The center insulator accepts either ¼" or ⅜" coax cable. Hardware used in the center insulator is iridite treated to MIL specs. The 7" end insulators furnished with the 248BDT feature deeply carved serrations that increase the leakage path to approximately 12 inches.

Engineered to take up to 500 watts AM; 1 KW P.E.P., the 248BDT is fed with 52 ohm coax and can be adjusted for phone or CW. SWR less than 2:1 at resonance on all three bands. The 248BDT is an ideal antenna system for the popular new 3-band transceivers for 20, 40 and 80 meters. It's sensibly priced at . . . **$22.50** Ham Net.

OTHER hy-gain MULTI-BAND DOUBLETS

. . . the doublets that are different !

Model 5BDT—Trap Doublet for 10-15-20-40-80 meters . . . . . **$34.95** Ham Net
Model 4BDT—Trap Doublet for 10-15-20-40 meters . . . . . **$24.50** Ham Net
Model 3BDT—Trap Doublet for 10-15-20 meters . . . . . **$17.50** Ham Net
Model 2BDT—Trap Doublet for 40 and 80 meters . . . . . **$19.95** Ham Net
Model 2TD—Trap Kit for 40 and 80 meters . . . . . **$12.95** Ham Net
Model 2BDP—Trapless Fan Doublet for 15-40-80 meters . . . . . **$19.95** Ham Net

See them today at your favorite Hy-Gain Distributors or write for the name of the Hy-Gain Distributor nearest you.

Hy-Gain Antenna Products Corporation 8413 N.E. Highway 6, Lincoln, Nebr.

For further information, check number 17, on page 110

your choice of 2 GREAT EICO® TRANSMITTERS...

designed by Hams... for Hams...

to the highest Ham standards

90-WATT CW TRANSMITTER* #720
Kit **$89.95** Wired **$129.95**
*U.S. Pat.
"Top quality"—ELECTRONIC KITS GUIDE
Ideal for veteran or novice. "Clean" 90W CW, 65W AM-phone with EXT plate modulation. 80 through 10 meters.

60-WATT CW TRANSMITTER #723
Kit **$59.95** Wired **$89.95**
"Compact; well-planned layout. Clean-sounding, absolutely hum-free carrier; stable." — ELECTRONICS WORLD.
Perfect for novice or advanced ham needing low-power standby rig. "Clean" 60W CW, 50W AM-phone with EXT plate modulation. 80 through 10 meters.

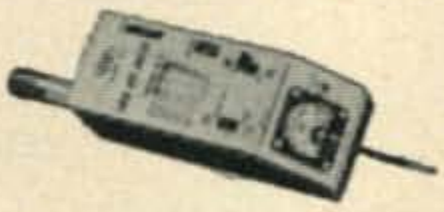
TRANSISTOR CODE PRACTICE OSCILLATOR #706
Complete with battery
Select variable tone, flashing light, or both together.
Phone jack for private use. Efficient speaker: clean loud signals.
Kit **$8.95** Wired **$12.95**

New!

VARIABLE FREQUENCY OSCILLATOR (SELF-POWERED) #722
Approaches crystal stability. 80 through 10 meters.
Kit **$44.95**
Wired **$59.95**

CITIZENS BAND TRANSCEIVERS
770 Series
Superhet; pre-aligned xmitter osc; match antennas by variable "pi" network. Single & multi-channel models.
From Kit **$79.95** Wired **$109.95**
U. S. Pat.

HIGH-LEVEL UNIVERSAL MODULATOR-DRIVER #730
Kit **$59.95** Wired **$89.95**
Delivers 50W undistorted audio for phone operation. Can plate-modulate transmitters having RF inputs up to 100W. Unique over-modulation indicator. Cover E-5 $4.50.



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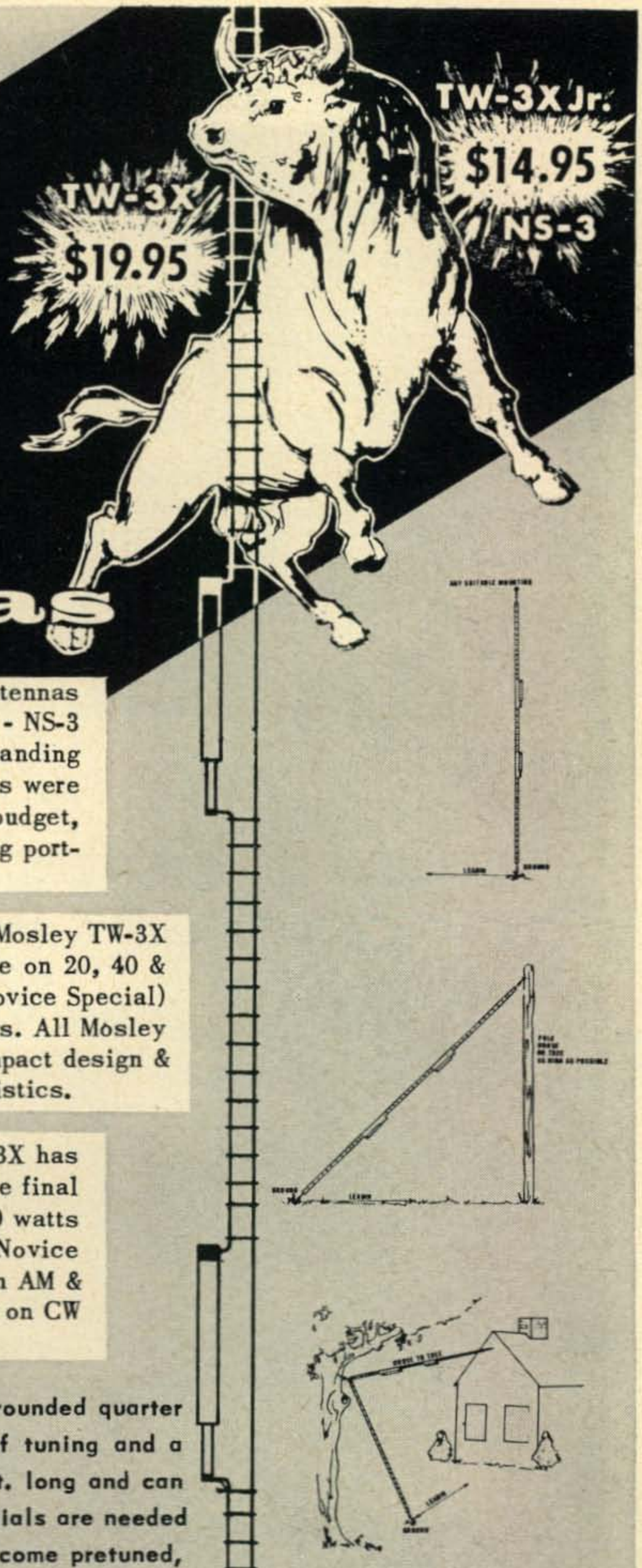
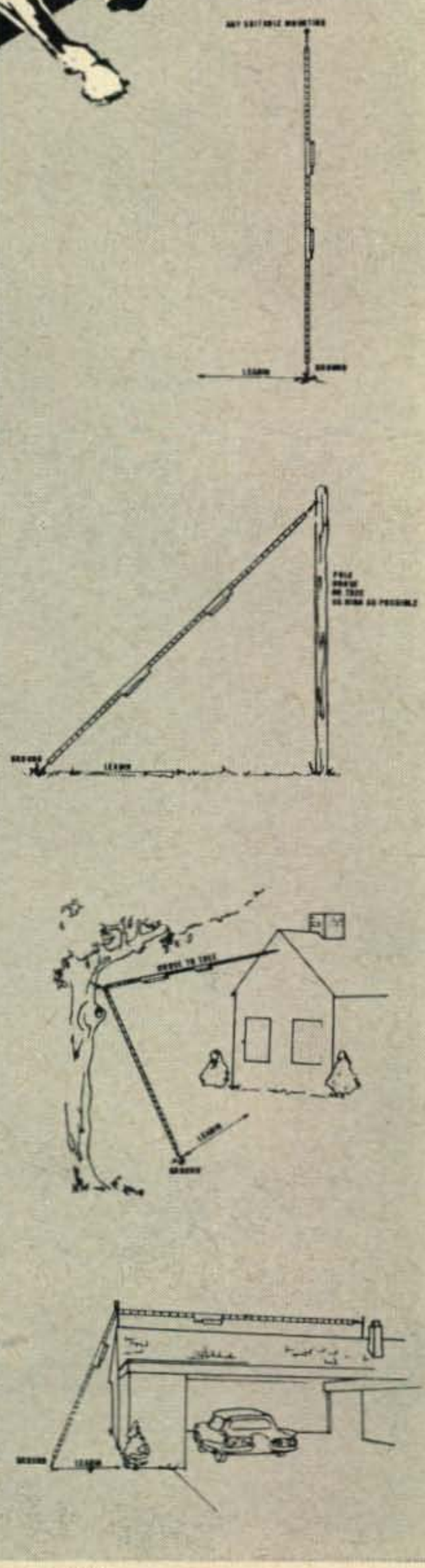


- **THREE MODELS** - Mosley El Toro antennas are available in three models, TW-3X - NS-3 and TW-3X Jr., designed to give outstanding performance. These versatile antennas were developed for the ham with a limited budget, limited space and the traveler working portable.

- **THREE BAND OPERATION** - Mosley TW-3X and TW-3X Jr. antennas operate on 20, 40 & 75/80 meters. Mosley NS-3 (Novice Special) operates on 15, 40 & 80 meters. All Mosley antennas feature pretuned, compact design & excellent broad band characteristics.

- **TWO POWER RATINGS** - Mosley TW-3X has an AM rating of 1000 watts input to the final amplifier and a CW/SSB rating of 2000 watts P.E.P. Mosley TW-3X Jr. and NS-3 (Novice Special) have ratings of 300 watts on AM & 1000 watts input to the final amplifier on CW and SSB.



Mosley El Toro antennas are trap type grounded quarter wave antennas using a unique method of tuning and a single 52 ohm coax line. Antenna is 58 ft. long and can be mounted to fit most any location. No radials are needed when mounted at ground level. Antennas come pretuned, in kit form and can be easily adjusted to resonate at any portion of the rated bands.

Mosley Electronics, Inc.

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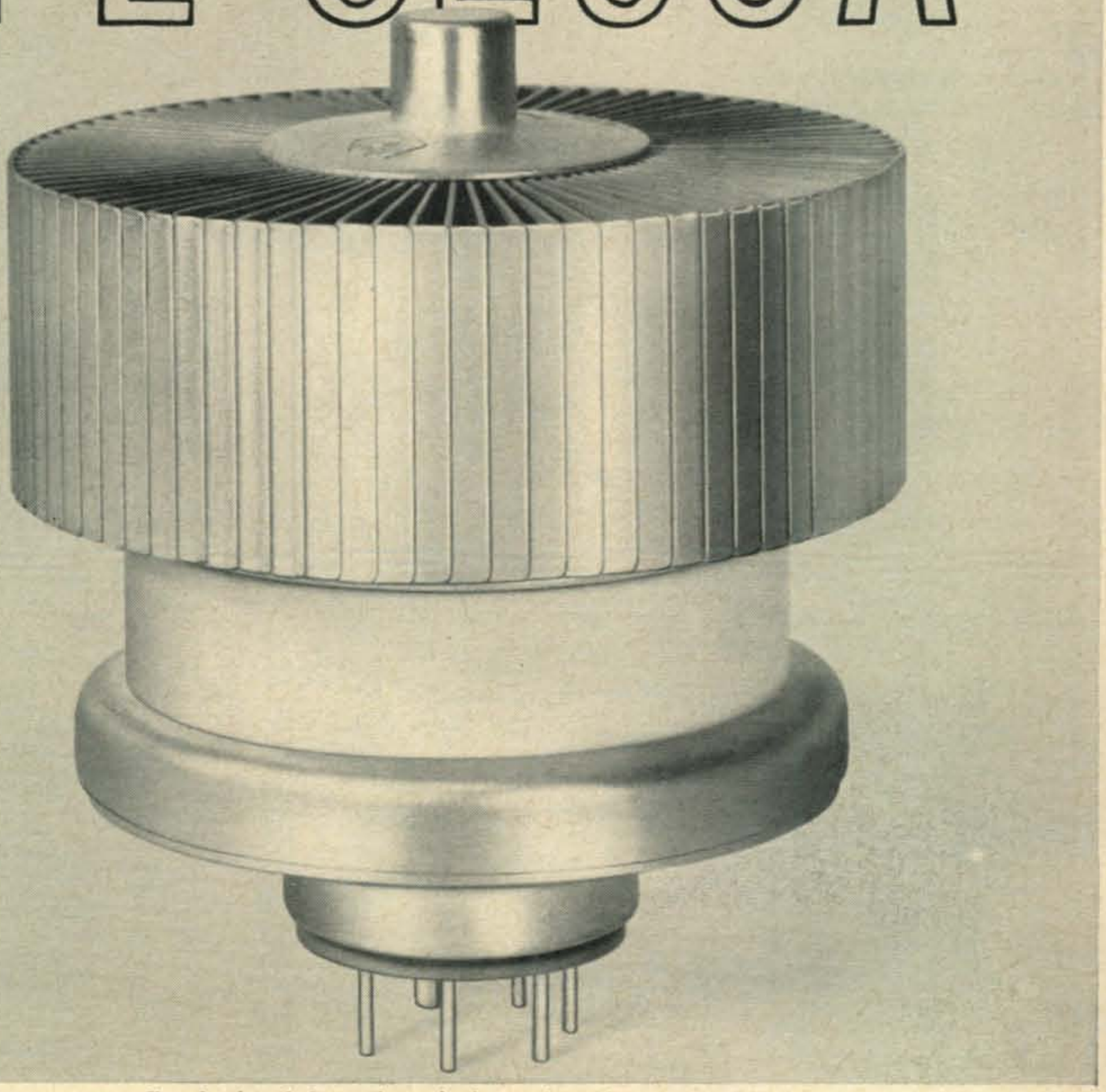

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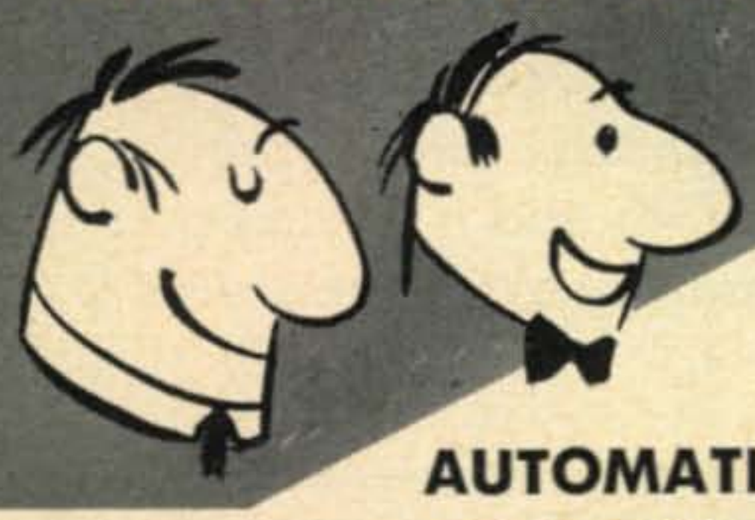

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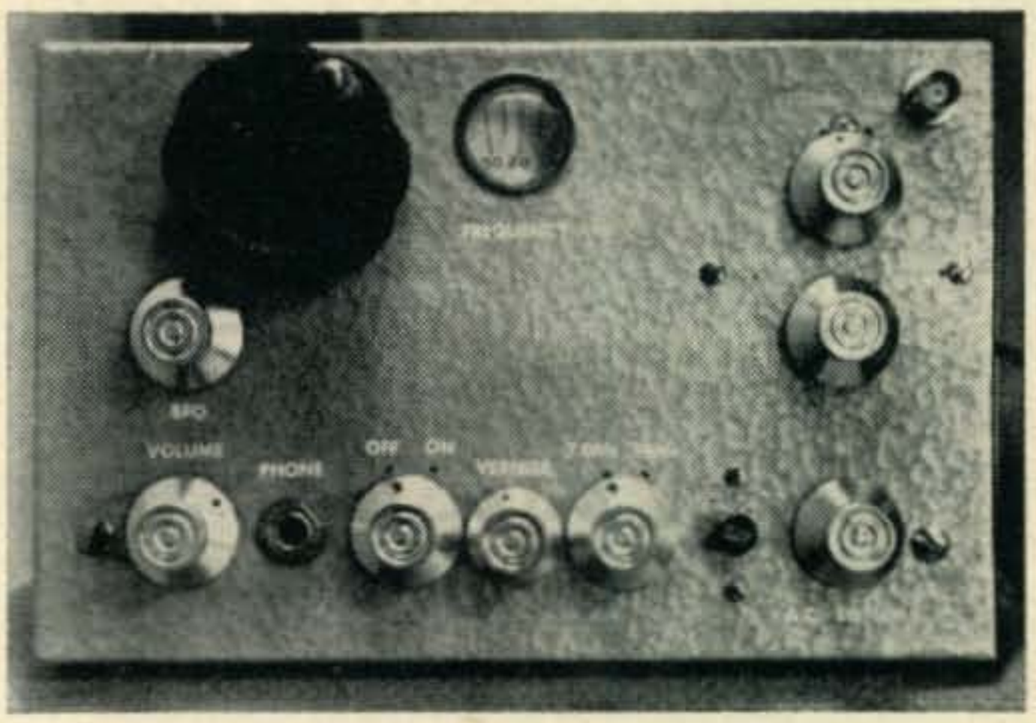
A Compact Receiver for the C.W. Man

BY E. H. MARRINER*, W6BLZ

Todays modern receivers, featuring all bands, all modes, all everything, often outdo themselves in weight, size and complexity. This receiver has been specifically designed for the c.w. man although with some changes it can easily be adapted for s.s.b. It covers 20 and 40 and is a compact unit with good calibration. The selectivity, and sensitivity are comparable to many commercial receivers.

THE "C.W. Special" is an eleven tube receiver (including rectifier and voltage regulator) expressly designed for the c.w. operator. A 500 cycle Collins mechanical filter, permanently connected, takes care of the i.f. selectivity problem and all of the components, with the exception of an ARC-5 variable capacitor, can be obtained through the local parts distributor.

The receiver, as presented here, tunes 7.0 to 7.2 mc and 14.0 to 14.2 mc but this can be changed by alteration of the oscillator frequency range. A great deal of design time was spent in achieving the configuration shown here and it is suggested that care should be taken before any changes are made.



Front view of the 40-20 meter c.w. receiver. The control functions, counter-clockwise starting from the upper left corner, are: MAIN TUNING; B.F.O.; AUDIO GAIN; CALIBRATOR; VERNIER TUNING, MIXER BANDSWITCH; R.F. TRIMMER (C_2, R.F. GAIN (on-off), ANTENNA TRIMMER and R.F. BANDSWITCH. The antenna input connector is in the upper right corner.

Circuit Operation

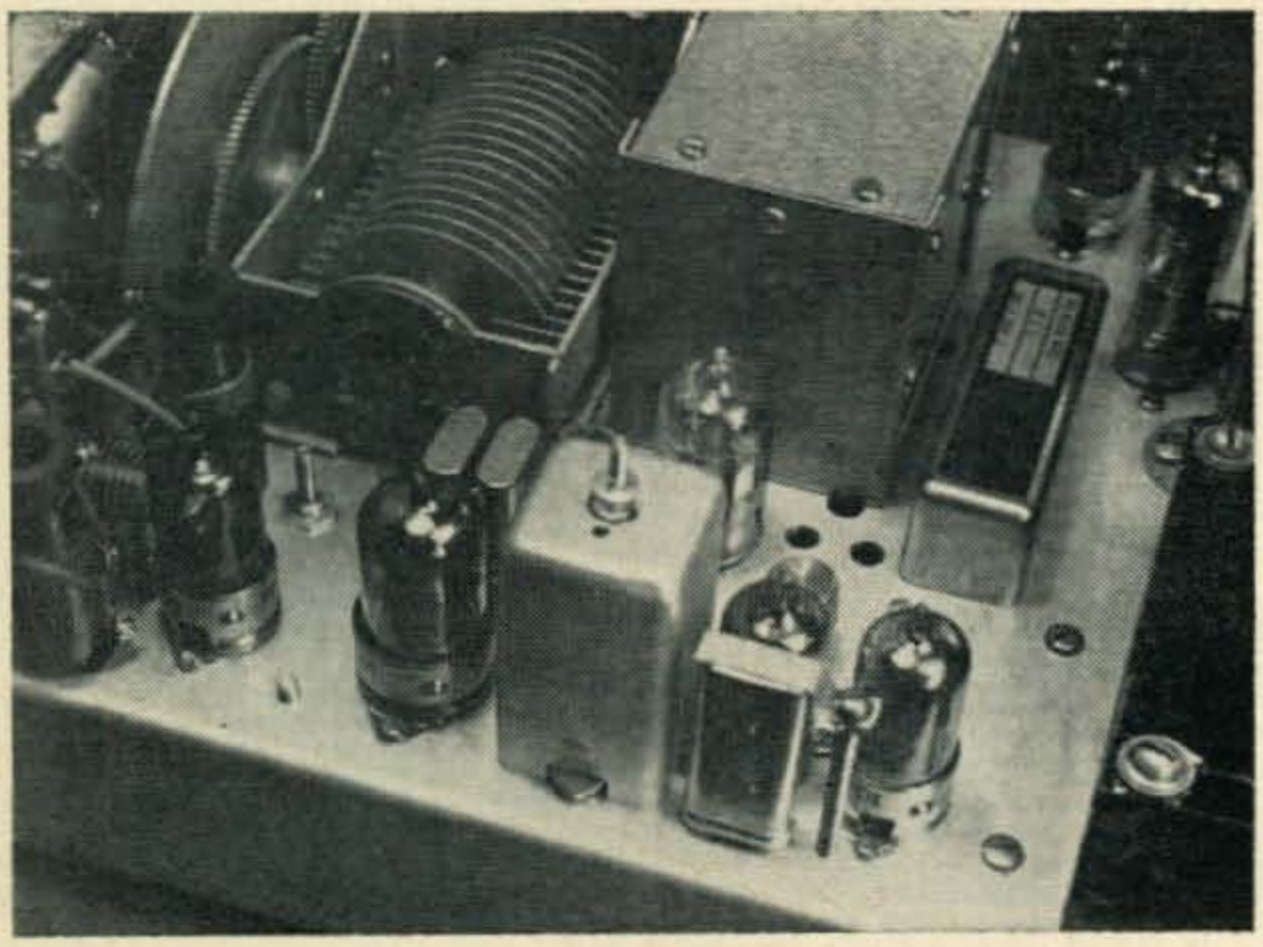
For 40 meter operation, signals feed link L_1 and couple into L_2 which is tuned by C_1. The signal is fed to the control grid of V_1 the gain of which is controlled by the 5K pot in the cathode circuit. The output of the r.f. amplifier is tuned, from the front panel, by C_2 and fed to V_2, the first mixer. Here it is mixed with the oscillator crystal frequency, for an output in the 4.4 to 4.6 mc range. Transformer T_1, a standard 4.5 mc TV sound i.f. transformer, is broad enough to accept this bandwidth.

The output of the first mixer feeds V_3, the second mixer. Here the signals mix with a tunable oscillator of 4855 to 5055 kc. The output of V_3 is 455 kc and is fed to the 500 cycle mechanical filter. The output of the 500 cycle filter is fed to a 6EW6, V_4, an i.f. amplifier and from there to V_5, the product detector. A plug-in type filter, F455E-05, may be used rather than the one listed in fig. 1 if various bandwidths are desired.

The audio output is fed to the triode section of the 6CX8, V_6 and from there to the pentode section.

The crystal calibrator, V_{11} is routine and is controlled by a front panel switch. The output

*528 Colima Street, La Jolla, California.



Front end mounting details of the two band c.w. receiver. The antenna trimmer, C_1, is mounted between inductors L_2 & L_4 at the left. Tubes from left to right are: V_1, 6BZ6; V_2 12AT7; V_{11}, 6BA6 (behind 100 kc calibrator crystal); and V_3, 6BE6. The 12AU7 tunable oscillator is mounted next to its shielded inductor. A 5Y3 (not shown in this photo) replaced the silicon rectifiers originally used. See text.

is coupled into the antenna by several turns of wire, as shown in fig. 1. The 3-30 mmf capacitor is used to zero the oscillator with WWV.

The b.f.o. is an Armstrong rather than the usual Hartley circuit. In the Hartley oscillator, as originally tried, the cathode, being above ground by the amount of the tap on the oscillator coil, picked up an a.c. hum. This hum modulated the signal and was apparent as the b.f.o. was tuned near zero beat. In the Armstrong circuit the cathode is directly grounded and the hum disappears.

The a.v.c. voltage is obtained by rectifying the audio signal using a diode with a high back resistance. The 1N538 has a back resistance of 10 megohms and a forward resistance of about 600 ohms. However, any other diode with a high back resistance will do nicely.

If the receiver is to be used for sideband, change C_9 to a high-quality 0.05 mf capacitor (metallic type) and remove the 3.3 megohm resistor in parallel with it. The 0.05 mf capacitor will charge rapidly and hold in for a long enough time to give smooth s.s.b. reception.

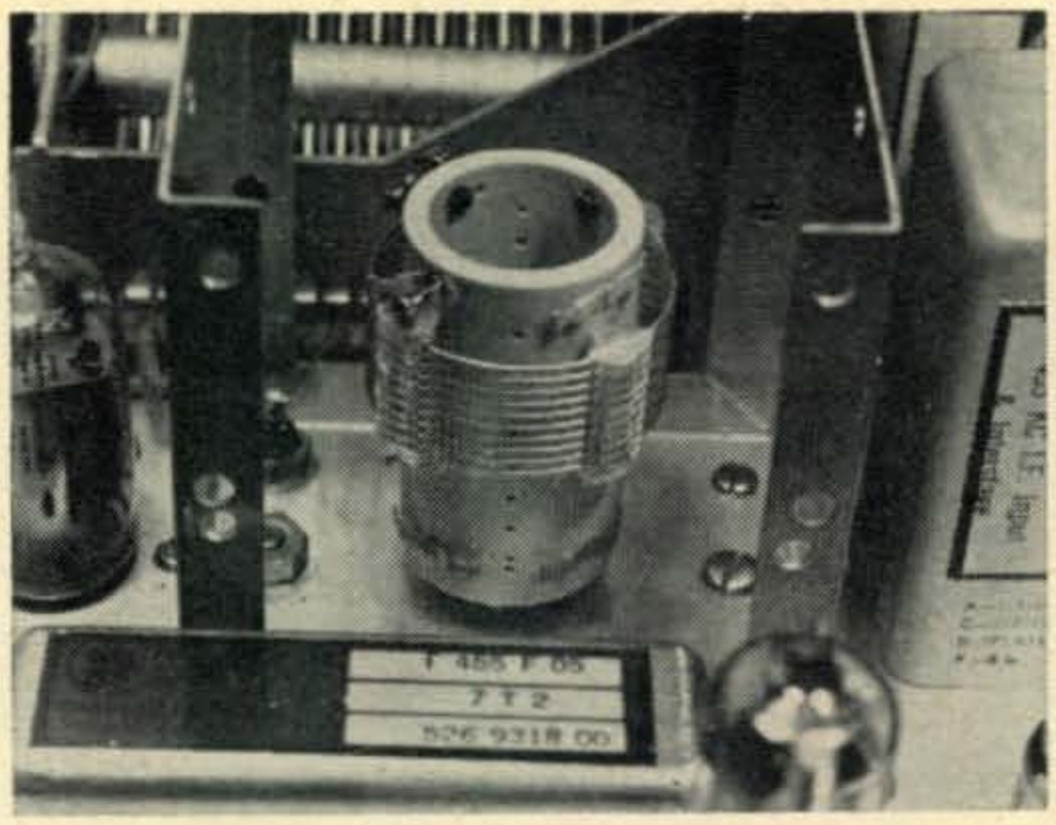
Although the power supply is straightforward the reason for not using silicon rectifiers should be mentioned. It was found, in an earlier model, that the high gain exhibited by the audio system actually picked up the switching transients of the diodes. R.f. chokes placed in the power leads did not completely eliminate the interference so a conventional 5Y3 was used in preference to a complete shielding operation.

Construction

The receiver is built in a California Chassis cabinet, number 469. The size is 5¾" high, 8 11/16" wide and 11¼" deep. The chassis comes with the cabinet and is 8 7/16" × 10 15/16" and 2" deep.

Construction can be started by mounting the power supply and audio stage components. The tuning capacitor and panel can also be assembled after drilling the necessary holes.

My method of construction was stage by stage. First I got the audio stage going, along with the



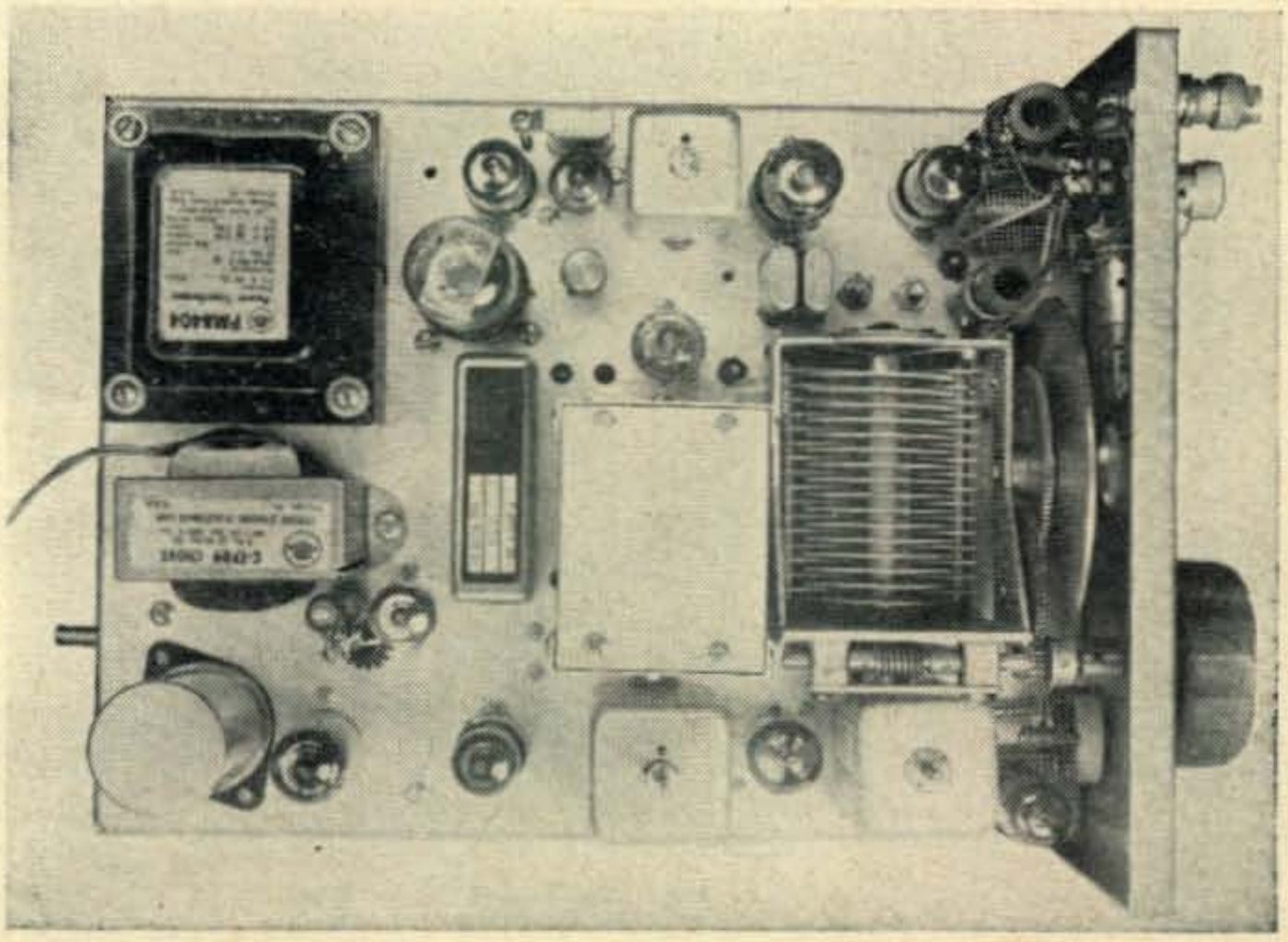
Interior view of the shield box containing L_7 in the tunable oscillator circuit. The coil stock is mounted on a National XR-62 form.

b.f.o. and product detector. By feeding in a 455 kc signal from a generator, I was able to check the stage performance and then go on with the project. No signal will be heard if the b.f.o. is not at 455 kc.

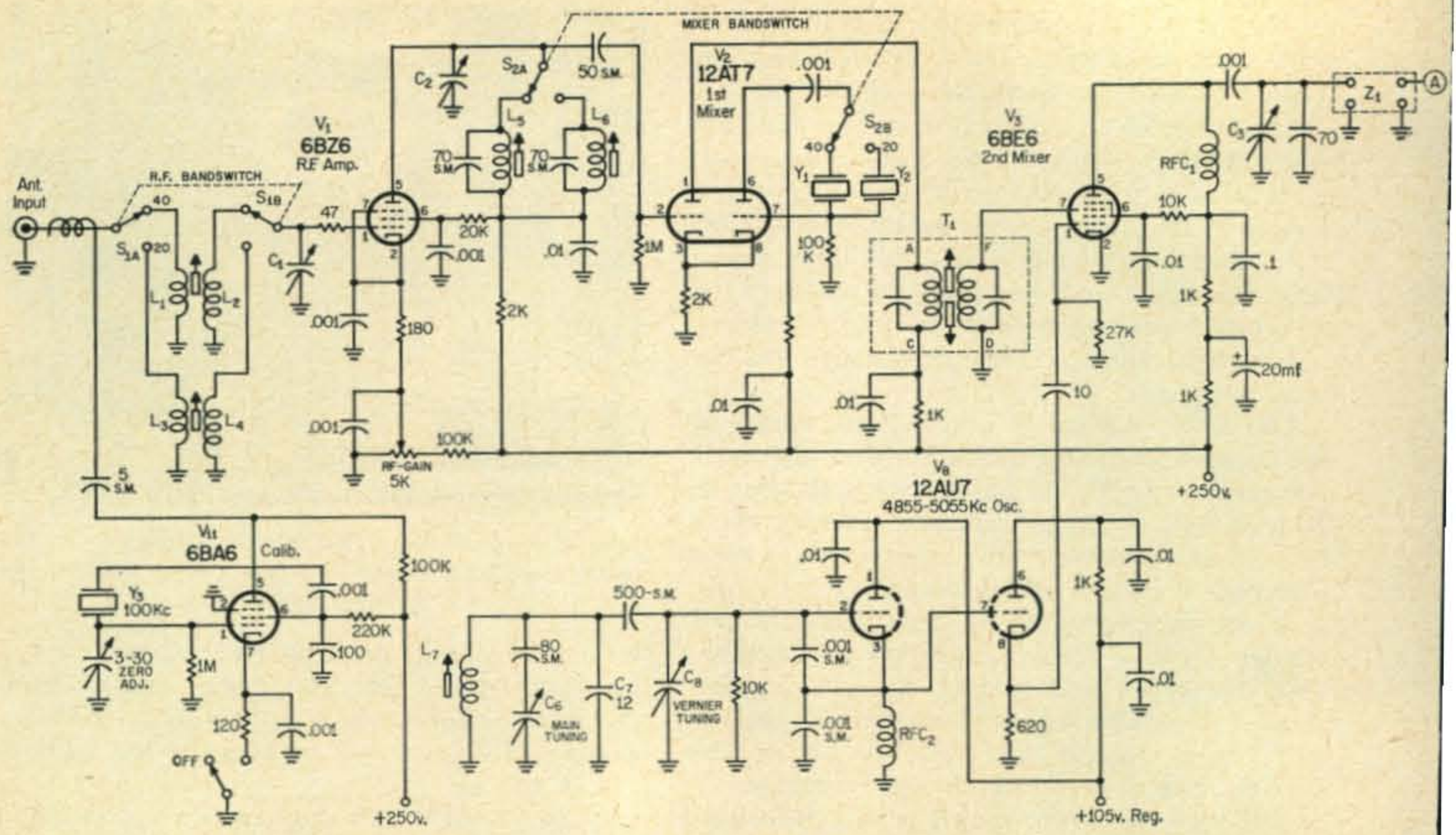
Next, the 6EW6 i.f. stage was wired in along with the 6BE6 second mixer. I could now feed the 455 kc signal into the control grid of the 6BE6 by coupling in through a small capacitor. Swinging the signal generator back and forth will indicate the selectivity of the filter. After this, I wired in the r.f. stage and first mixer.

One thing further remained and that was to track the tuning oscillator. It had to tune the range 4855-5055 kc, with an output of about 3 volts, to mix with the 6BE6 mixer. After experimenting with open bulk coil mounted on insulators, I decided better stability could be obtained by putting the coil in a "beefed up" box. This also reduced some of the radiated signal. As it turned out an LMB number 871 "Jiffy Box," 2¾" l. × 2⅛" w. × 2¾" deep, fit very nicely behind the tuning capacitor.

The oscillator tuning range is adjusted by changing the value of the silver mica capacitor in series with C_6. As this silver mica is reduced in value the frequency coverage is reduced; how-



Top view of the c.w. Special receiver for 40 & 20 meters using a surplus ARC-5 tuning capacitor. The 2¾" × 2⅛" × 2¾" box houses the tunable oscillator inductor L_7. Tubes at the bottom from left to right are: V_1, 6CX8; V_4, 6EW6; V_5, 12AT7; and V_7, 6C4. The 5Y3 and 0B2 are mounted above and below the Collins mechanical filter.



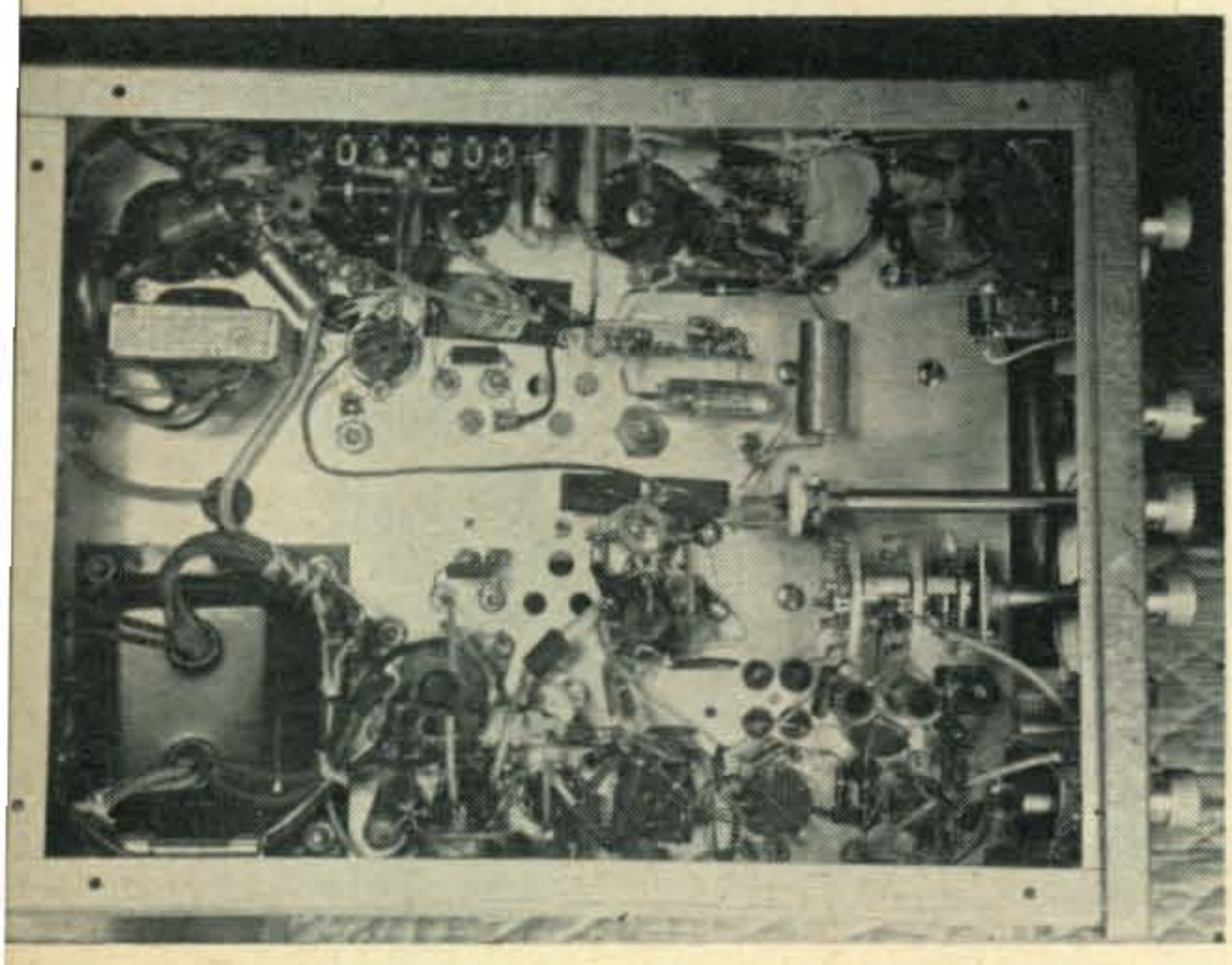
ever, the actual tuning frequency becomes higher. To bring the frequency back down to where it should be, the slug in L_7 may be adjusted. Variable capacitor C_8 is added in order to compensate for any small differences in crystal frequency when switching bands, insuring accurate dial calibration.

When the variable oscillator was finished and fed into the mixer, all slug tuned coils and i.f. transformers were adjusted with the dial set at 7100 kc.

If you are wondering about the dial port, it is an old dial-light jewel of the 115 volt type (1"diam.). I knocked the glass out, and forced in a piece of clear lucite. This was polished and a hair line scribed on the surface.

I might mention, if you drill holes and build as you go, use a hand drill or remove the mechanical filter as it can be damaged by abuse.

The $8\frac{7}{16}$" × $10\frac{15}{16}$ × 2" chassis is wired in stages. The 100 kc crystal calibrate zero-adjust capacitor is mounted to the right of the 5Y3 rectifier socket and inductors L_5 and L_6 are mounted below the mixer bandswitch. The 8K, 10 watt variable resistor in the power supply is mounted behind the audio transformer T_3, at the upper left.



Spurious Signals

The level of spurious signals will depend upon how well you filter the leads to all stages. This will keep unwanted signals from chasing around the chassis wiring and getting into the wrong places. A further help is to bypass all oscillator filaments right at the tube socket pin with a 0.01 mf disc ceramic capacitor. This is especially true for the b.f.o., since it will prevent harmonics from flowing back down the filament leads.

No special shield was found necessary in the receiver except for the can on L_7 to reduce radiation from the coil. Use shielded wire on all of the audio gain control circuits going to the panel.

Alignment

To peak the circuit, feed a signal from a stable source into the input at 7100 kc. Advance the R.F. GAIN control fully and tune C_1. If it doesn't resonate at mid position, set it at the mid position and adjust L_2 for maximum signal. Do the same thing with L_5 and C_2.

Next peak, T_1 and then C_3 and C_4 for maximum output. Follow right along and peak T_2. If the receiver has no output, one good reason may be that the slug of T_4 has not been adjusted. There will be no output from the product detector unless the b.f.o. is within range to produce a beat. Set C_5 at mid-scale and adjust the slug until a beat note is heard.

I think you will get a lot of pleasure bringing the receiver to life! You are sure to learn a lot just by tinkering with it. ■

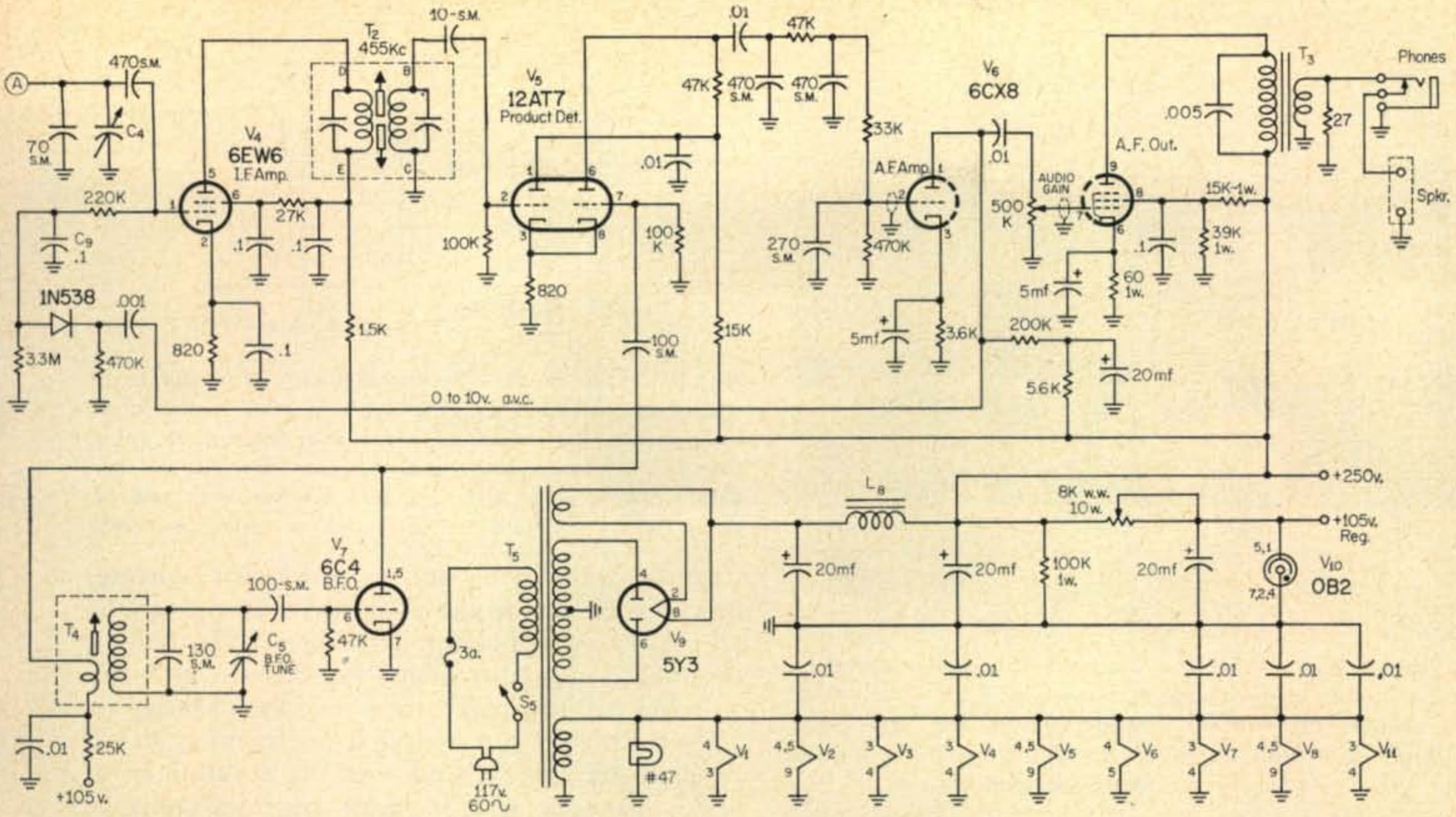


Fig. 1—Diagram of the "C.W. Special," a 20 and 40 meter receiver. Unless otherwise noted all resistors are ½ watt, all capacitors less than one are in mf and greater than one in mmf unless otherwise indicated. Capacitors marked SM are silver micas and all decimal values are disc ceramic.

C_1—100 mmf APC type with ¼" shaft.
C_2—15 mmf APC type with ¼" shaft.
C_3, C_4—25 mmf variable ceramic, Mallory ST-557-N.
C_5—25 mmf, Hammarlund APC-25.
C_6—180 mmf. ARC-5 transmitter variable, 16 rotor and 16 stator plates.
C_7—12 mmf glass capacitor.
C_8—9 mmf miniature variable. Johnson 9M11.
L_1—7t. of hookup wire on cold end of L_2.
L_2—20t. #26e., close wound on National XR-50 form.
L_3—4t. of hookup wire on cold end of L_4.
L_4—9t. #20e. close wound on National XR-50 form.
L_5—8.2 μh. Miller #42A826CBI.
L_6—2.2 μh. Miller #42A226CBI.
L_7—10t. Air-Dux #1016 on a National XR-62 form.
L_8—8 hy, 85 ma. Stancor C-1709.
RFC_1—10 mh, 125 ma, J. W. Miller #4540.
RFC_2—2.5 mh r.f. choke.
S_5—Ganged with 5K pot. (R.F. GAIN Control).
T_1—4.5 mc TV sound i.f. transformer. J. W. Miller #1466.
T_2—455 kc i.f. J. W. Miller #913-C1.
T_3—7600 ohm to 3.2 ohm, 5 watt output transformer. Stancor A-8114.
T_4—Oscillator coil, J. W. Miller #X-320-C.
T_5—520 v. at 90 ma, 5 v. at 2 a, 6.3 v. at 3 a. Stancor PM-8404.
Y_1—11,600 kc (for 40 M.) International Crystal FA-9.
Y_2—18,600 kc (for 20 M.) International Crystal FA-9.
Z_1—455 kc Mechanical Filter, 500 cycle bandwidth. Collins F455F-05.

A Stable Transistorized V.F.O.

BY COMMANDER PAUL H. LEE*, W3JHR

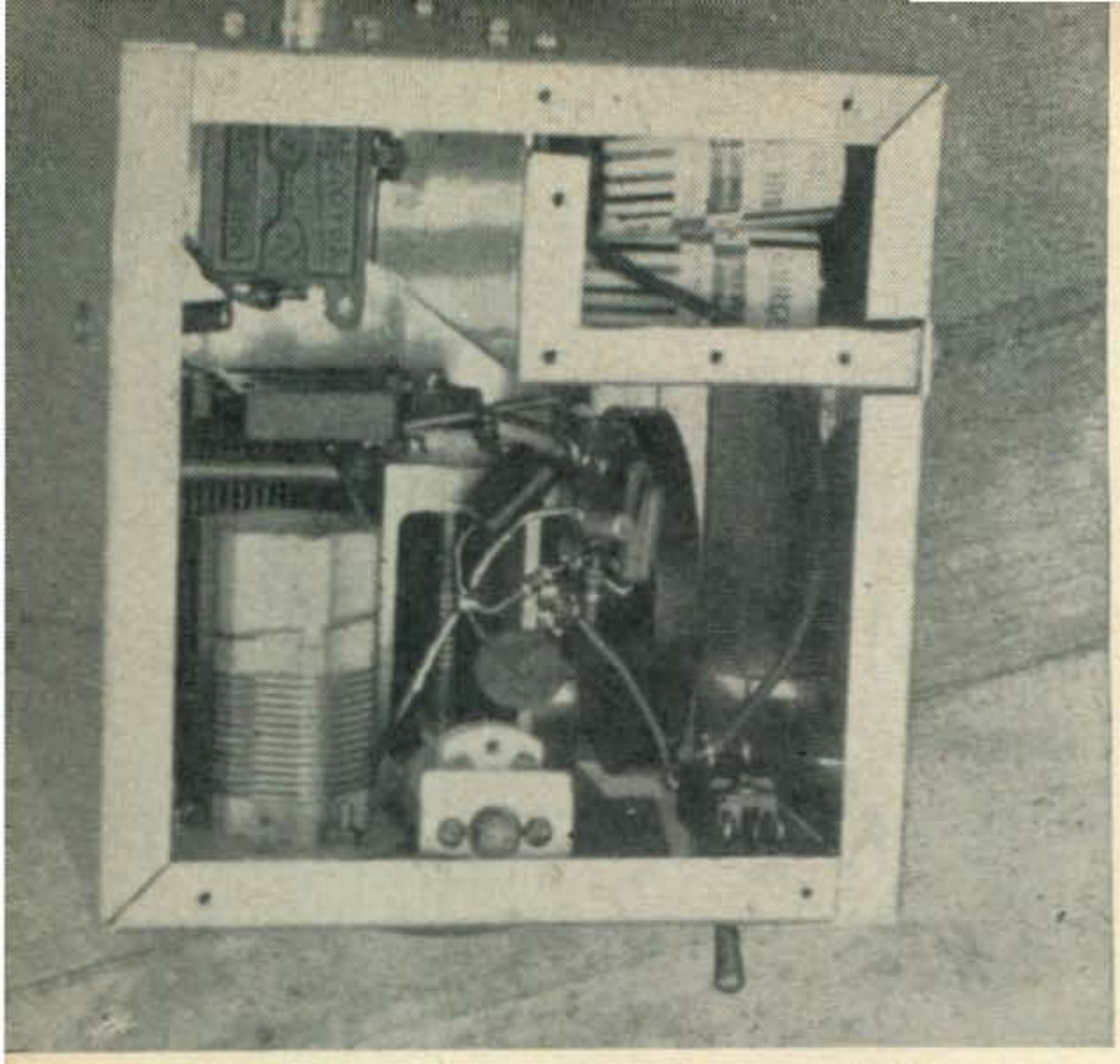
Here is a v.f.o., using two transistors and ARC-5 components, that is so stable that it may be considered a "synthetic rock." Since it is made primarily from ARC-5 parts it is very economical.

ALMOST everybody reads the *Bulletin,* says the familiar ad in Philadelphia. And likewise, almost everybody on the amateur bands has a v.f.o. these days, except rock-bound Novices, of course. However, their day will come, and this article should be of interest to them also.

Most homemade v.f.o.'s and some commercial models (including those in transmitter units) suffer from "driftitis," a disease whose severity is proportional to the patient's temperature. Much has been written by knowledgeable authors on the subject of v.f.o. frequency stability, but unfortunately no one has yet been able to divorce the heat-producing vacuum tube from its connection to a tuned circuit which is supposed to maintain stability. This would be a neat trick if one could do it!

With the advent of semiconductors in plenty, however, there is promise of real progress in the field of stable frequency generation with very simple circuitry within reach of the amateur pocketbook. The v.f.o. described here is my own answer to that requirement. Impetus was added to my motivation by the necessity of operation

*5209 Bangor Drive, Kensington, Maryland.



Bottom view of the transistorized v.f.o. built around an LM tuning capacitor and housed in a 6" × 6" × 6" cabinet. The battery compartment at the rear holds eight #1 flashlight cells. An ARC-5 coil form is used for L_1 for improved stability.

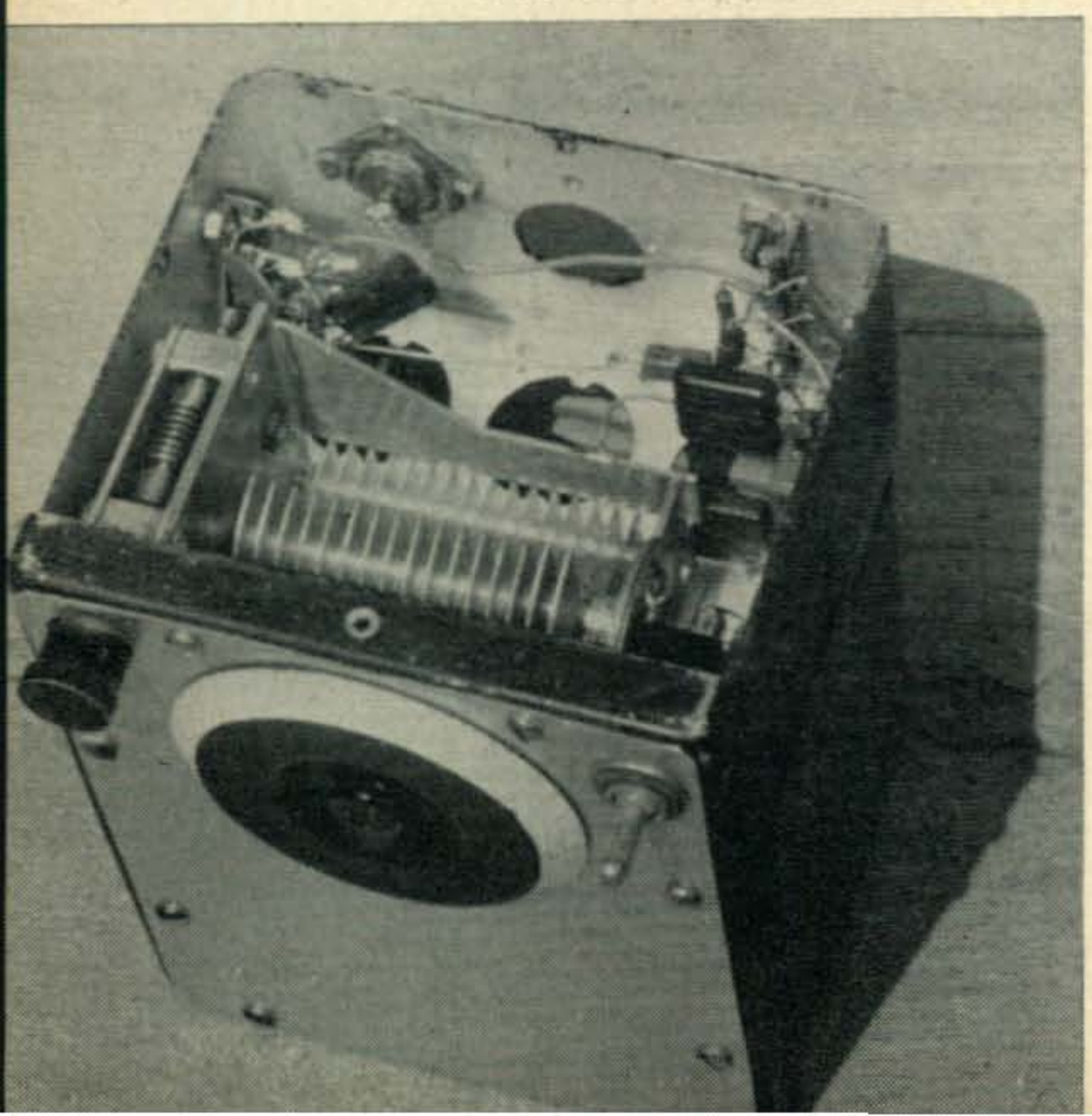
on Navy MARS and Naval Reserve frequencies outside the amateur bands with adequate stability (0.003% tolerance), which previous vacuum tube v.f.o.'s did not do.

Construction

This transistorized v.f.o. is extremely simple to build, and is quite inexpensive. In a previous issue of *CQ*[1], I described a v.f.o. built from a cut-down ARC-5 command set. For those who do not have the back issue, the ARC-5 chassis was cut just ahead of the oscillator section, the front panel was moved back, the amplifier tuning capacitor, with its dial, replaced the oscillator capacitor, and the ARC-5 oscillator components were used in a vacuum tube circuit. The same mechanical concept is used in the transistorized

[1]Lee, Paul, "Low Cost VFO," *CQ*, July 1955, page 33.

Bottom view of the transistorized v.f.o. built on a cut down ARC-5 chassis. A false front panel is used to cover the extra holes. The r.f. output jack can be seen in the rear left corner.



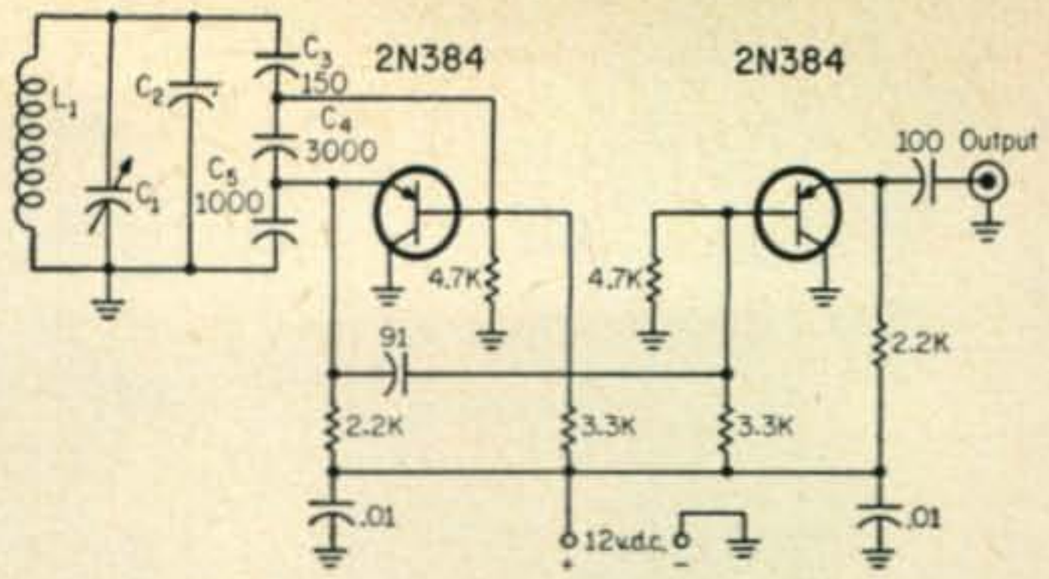


Fig. 1—Circuit of the "Synthetic Rock" v.f.o. The tank circuit components, L_1, C_1, C_2, are ARC-5 oscillator components, the values of which are dependent upon the ARC-5 chosen and the frequency desired. All resistors are ½ watt; all capacitors greater than one in value are in mmf and less than one in value are in mf.

v.f.o. described here, but the process of "cutting down" is carried to the extreme by stripping out all the wiring and components except the oscillator tuning capacitor below the chassis, and the coil and padding capacitor above the chassis.

Two 2N384's are mounted on terminal strips beneath the chassis, and with the addition of a few capacitors and ½ watt resistors, plus a coaxial connector and two batteries, the unit is wired up as shown in fig. 1. The two Z4 6 volt batteries in series provide the 12 volts power for the unit. Eight #1 flashlight cells can also be used in series, and will fit in the space at the rear of the chassis.

Stability

One of the secrets of the excellent frequency stability of this unit is the fact that the oscillator transistor is connected across a relatively low impedance (C_4 and C_5), and is quite loosely coupled to the tuned circuit through the voltage divider action of C_3, C_4, and C_5. This effectively removes the transistor from the frequency determining tank circuit itself. In fact, C_3 could be made even smaller if desired. Its lower limit would be that capacity which still permits the circuit to maintain oscillation.

This circuit is the result of much trial and error. Many published circuits involve connection of the transistor across high tank circuit impedances resulting in a peculiar instability which manifests itself as a low frequency rumble or burble on the signal. It was actually an irregular frequency shift of only a few cycles (perhaps less than five cycles) about a very stable mean frequency, but the frequency could be seen as a fluctuation of the receiver S-meter. The long-term frequency stability was excellent, but the burble was there due to making the transistor look into too high a tank circuit impedance.

The 2N384's work very well in the circuit shown here. The emitter-follower buffer provides excellent isolation from anything that follows that stage. The v.f.o. can of course be designed to work on any frequency you wish. In my case I use it on 4.9-6.1 mc, to provide the injection frequency for the s.s.b. exciter.[2] It

[*Continued on page 90*]

[2]Lee, Paul, "Crystal Filter Type S.S.B. Exciter," *CQ*, November 1961, page 32.

160M. QRP for Medium Power Rigs

BY HAROLD E. DAVIS*, W8MTI/A8QZT

Now that the 160 meter band is open for operation in all states, a lot of amateurs are trying to operate their DX-100's and Viking transmitters at reduced input.

In many states the maximum power limit is 25 watts input. Operation of the DX-100 and Viking at this low input can lead to other problems such as arc-over and severe distortion due the extreme change in plate impedance as presented to the secondary of the modulation transformer.

Some of the methods tried to reduce the input of either of these transmitters to the 25 watt level include using a lightbulb or resistor in the primary of the plate transformer. This results in quite poor regulation which leads to other problems which will not be discussed here.

It occurred to the author that another method, less expensive than purchasing a variac type transformer, was capable of giving the desired results with only slight modification of the original transmitter. This modification should not reduce the resalability of the transmitter.

In a few words, this system entails using a TV type power transformer which may easily be salvaged from an old chassis. The two primary and the three secondary leads of the plate transformer in the transmitter are disconnected inside the transmitter and reconnected to the five-pin Amphenol MIP male chassis plug mounted on the rear of the chassis. A five pin female MIP plug is mounted near the male plug and then wired to the appropriate points in the transmitter from which the plate transformer leads were disconnected. A jumper cable is then made using five lengths of high-voltage plastic insulated wire, ending in a male plug at one end and a female at the other. Another five pin male plug is then used to connect to the primary and high-voltage leads of the TV power transformer. All these connections are shown in fig. 1.

For normal operation the jumper cable is used between the two chassis plugs thereby connecting the regular plate transformer into the circuit in the normal manner. For QRP operation the jumper cable is removed and the TV transformer plugged into the female plug.

Caution: make sure the insulation used for the jumper cable wiring is enough to handle the high voltage.

Incidentally, QRP operation is a good idea on other bands when the full power of the transmitter is not needed. ■

*4761 Baldwin Street, Onandaga, Michigan.

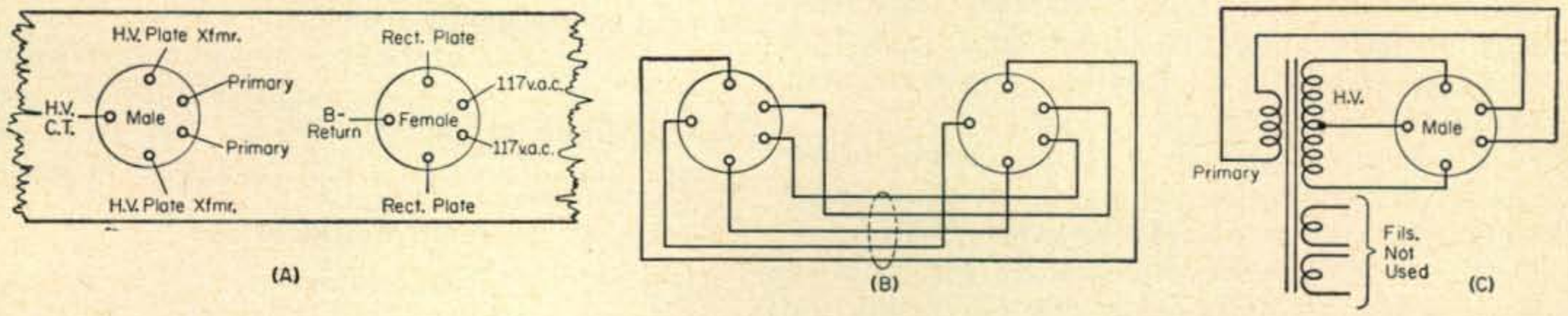


Fig. 1—The modification shown above permits operation of the DX-100 or Viking transmitters at 25 watts on 160 meters. The male and female plug arrangement is shown in (A) while (B) shows the simple jumper plug used for normal operation. A TV type power transformer shown in (C) is used for reduced power.

ALL NEW... COMPLETELY DIFFERENT... NEVER BEFORE DONE!

A complete issue of CQ devoted to tools and workshop practices for the amateur. An absolute must for the home-brewer, the kit builder, and the ham who repairs and modifies his own station.

This issue will feature articles on chassis-punching and layout, wiring, soldering techniques, tool selection, workshop planning, etc.

All this, and much more will be presented in the Special November CQ Annual. This issue will be a permanent reference guide in your shack. Don't miss it. November CQ. A real beauty!

A Surplus Vidicon TV Camera

BY MARTIN L. KAISER*, W2VCG

For the amateur who would like to get started in TV without investing a great deal of money, this article describes, in detail, the conversion of a surplus ATK-ARK iconoscope system into a highly sensitive one-inch vidicon system.

ONCE again there seems to be an upsurge of interest in amateur television. A surplus ATK-ARK iconoscope system conversion is described in this article. The total cost of this unit, after conversion, is around $100; the initial investment is somewhat higher, but sale of the unused iconoscope and lens helps to defray the original cost.

The conversion is accomplished in three general steps. First, the chassis is stripped of all components that will not be used (some of these components can be resold); second, the sweep frequencies are changed to those standard for TV; and, finally, a 7038 or the 7735A vidicon is installed. A 6198 will do too.

Component Removal

In the first step, the following components are removed: the lens shutter, shutter relay, lens, lens heater, iconoscope, iconoscope mounting brackets, bias light, iconoscope-compartment shield and yoke support bracket.

Lift the yoke through the large opening in the chassis so that it is on the upper side of the unit. Cut a small notch towards the front of this opening to allow freedom of movement for the yoke wires when the yoke is in position inside the focus coil.

Focus Coil

A focus coil for the vidicon must be constructed as shown in fig. 1. After the form is glued together, 3,500 turns of #30 enameled wire is scrambled wound to a uniform depth across the entire length.

*418 Hale St., Pennington, N. J.

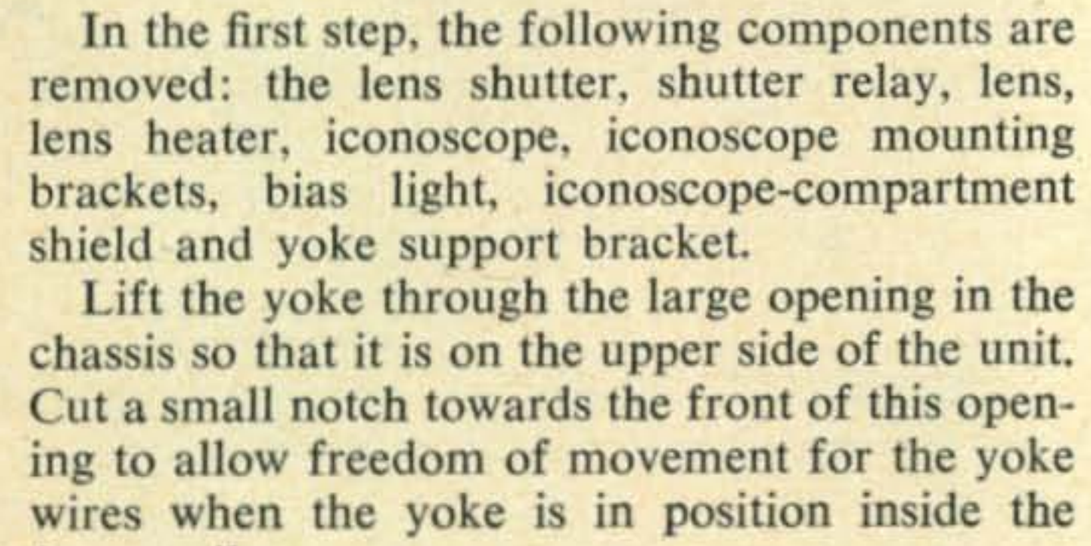
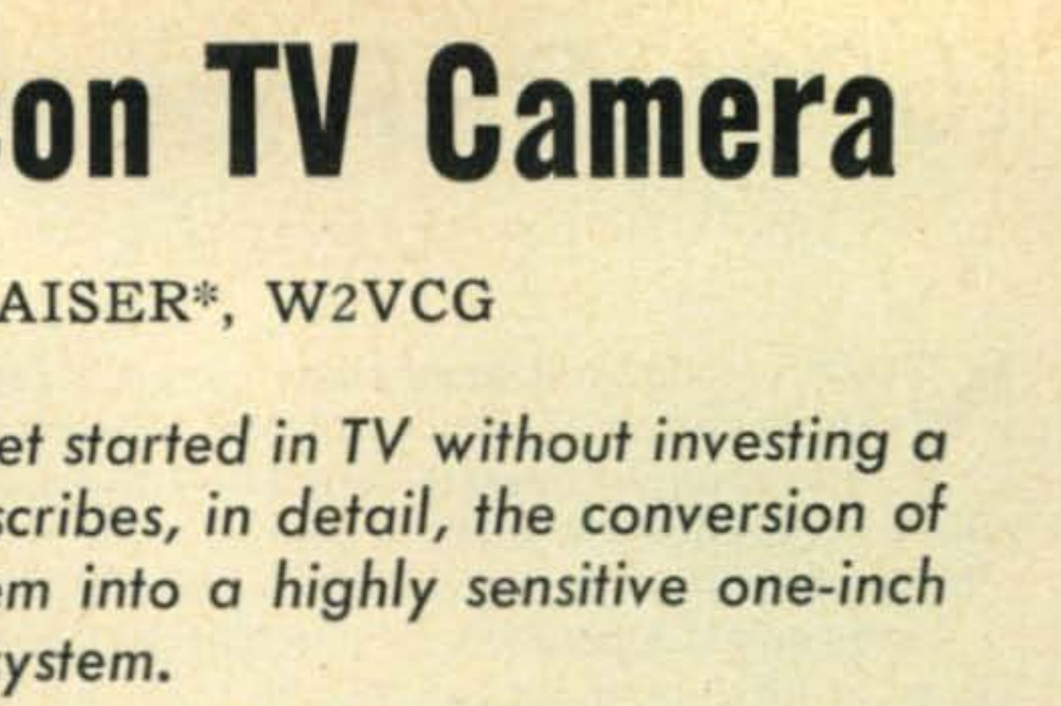


Fig. 1—Construction data for the focus coil to be used with the vidicon in the modification of the ATK-ATR TV camera. The end blocks are ¼" bakelite and the center tube is of 2½" o.d., ⅛" wall bakelite.



Side view of the unmodified ATK TV camera.

After winding the focus coil, fasten it, together with the magnetic focusing potentiometer, to the case inside the large compartment vacated by the iconoscope. Slide the yoke into the focus coil opening so that the leads enter from the front. The focus coil circuit is shown in fig. 4.

Circuit Modifications

For proper heater voltage on V_{107} and V_{103}, shunt R_{198} and R_{199}, individually, with two 36 ohm 1 watt resistors as shown in fig. 2.

Change C_{132} to a 120 mmf NP0 ceramic capacitor so that the horizontal oscillator runs

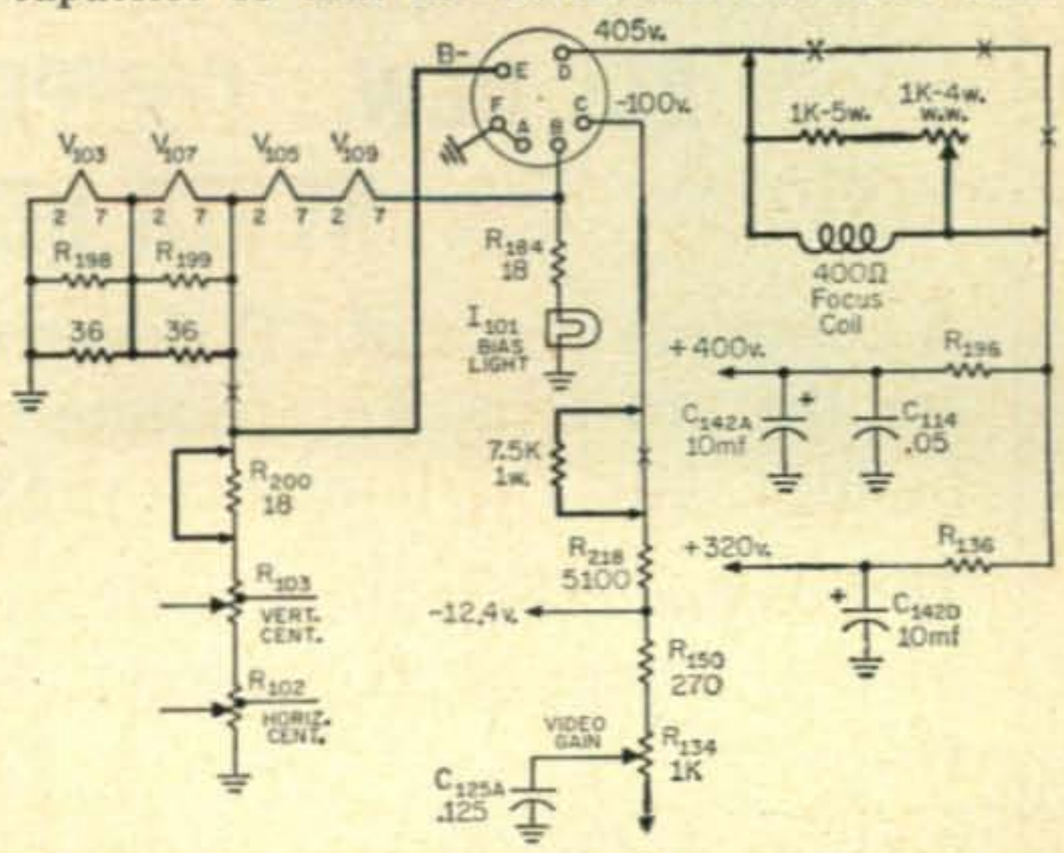


Fig. 2—Several of the modifications to enable operation of the ATK-ATR TV camera are shown above. These are the filament circuit, centering circuit, focus coil, minus 100 volt input and the bias light to be removed as noted in the text.

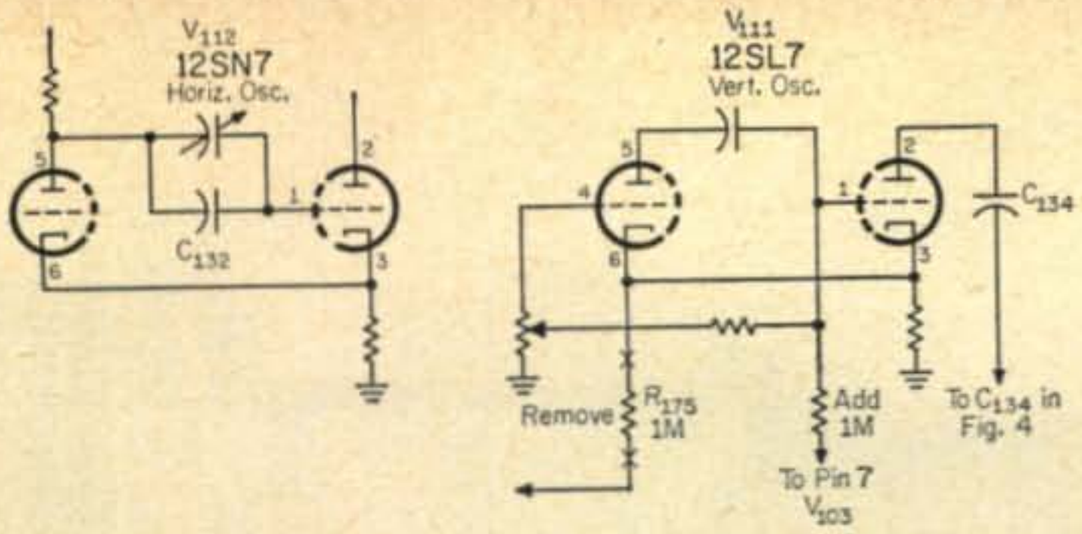


Fig. 3—Circuit areas of the changes required in the horizontal and vertical oscillator circuits to permit operation on the standard TV sweep frequencies, 60 and 15,750 cycles. Also shown is the removal of R_{175} in the keystoning circuit and the vertical blanking line to be wired to the vidicon circuit.

at 15,750 cycles per second. This is shown in fig. 3. Inductance L_{115}, the master-oscillator coil, shown in fig. 4, is adjusted later to this same frequency by means of the monitor TV set. Bring the range of the vertical oscillator to 60 c.p.s. by wiring a 1 megohm ½ watt resistor from pin 1 of V_{111} to pin 7 of V_{103} as shown in fig. 3.

Short R_{200} and remove the wire leading from this resistor to the junction of pin 7-V_{107} and pin 2-V_{105}, at the tube end, and extended to pin E of the power socket as shown in fig. 2. Insert a 7500 ohm 1 watt resistor in the lead from pin C at the power socket to R_{218} also shown in fig. 2.

Fasten a 1 megohm variable resistor to the shutter relay bracket for vidicon bias. Ground one end of this variable resistor and wire the other end lug to pin C of the power socket as shown in fig. 4.

Eliminate the iconoscope divider networks and blocking resistors by removing R_{101} (270K), R_{125} (330K), and R_{107} (470K) also shown in fig. 4.

The network which provides the focus and target voltage potentials for the vidicon is converted from the original bias-focus divider for the iconoscope. Remove the wire on pin 5 of the iconoscope from the lug (originally connected to R_{107}), and fasten it to the top of R_{108}. From C_{109} to pin 4 of V_{105}, run a lead to supply the +318 volts required for the divider network. The resulting circuit is shown in fig. 4.

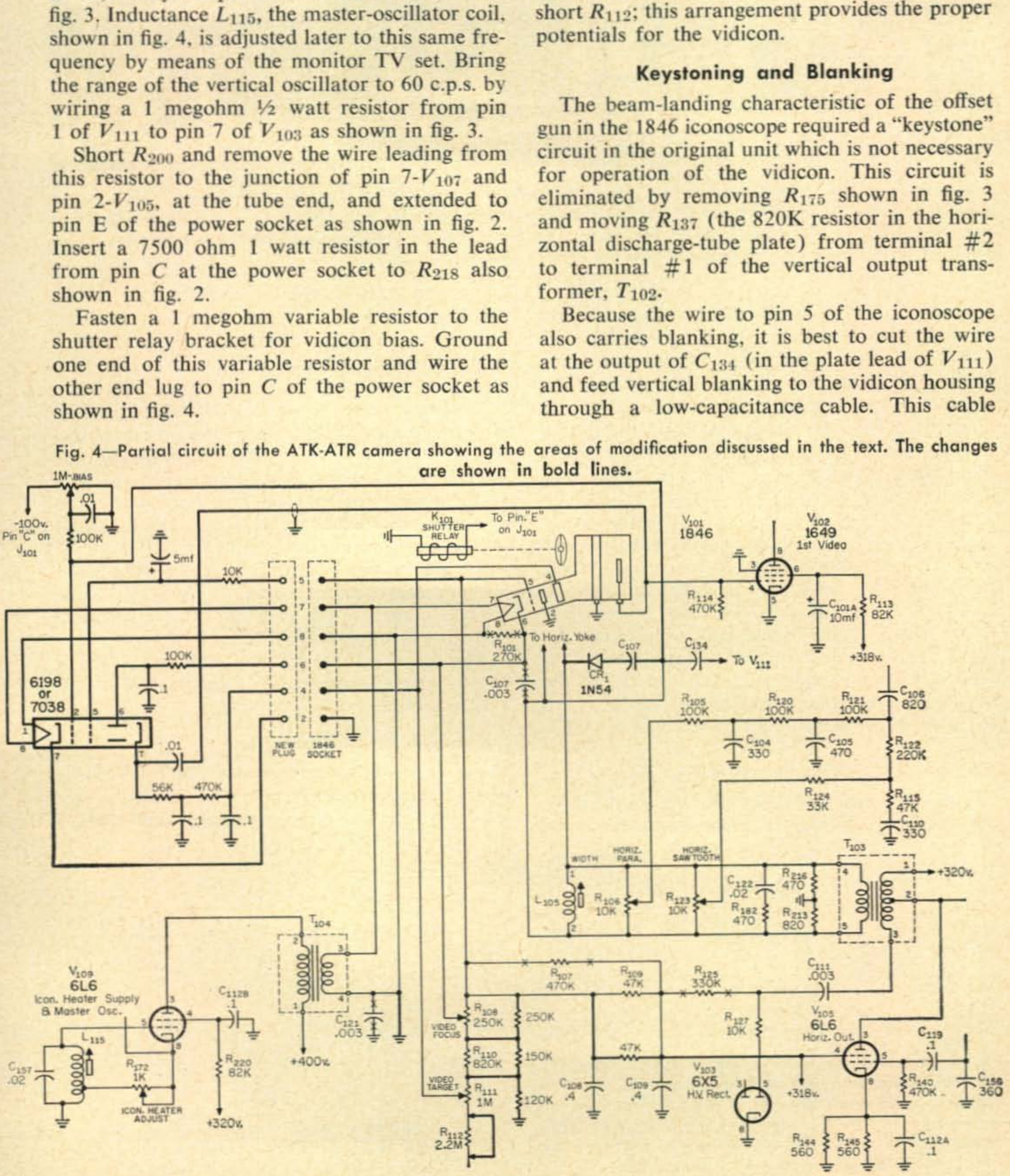
Shunt R_{109} with a 470K ½ watt resistor, R_{108} with a 250K ½ watt resistor, R_{110} with a 15K ½ watt resistor, R_{111} with a 12K resistor, and short R_{112}; this arrangement provides the proper potentials for the vidicon.

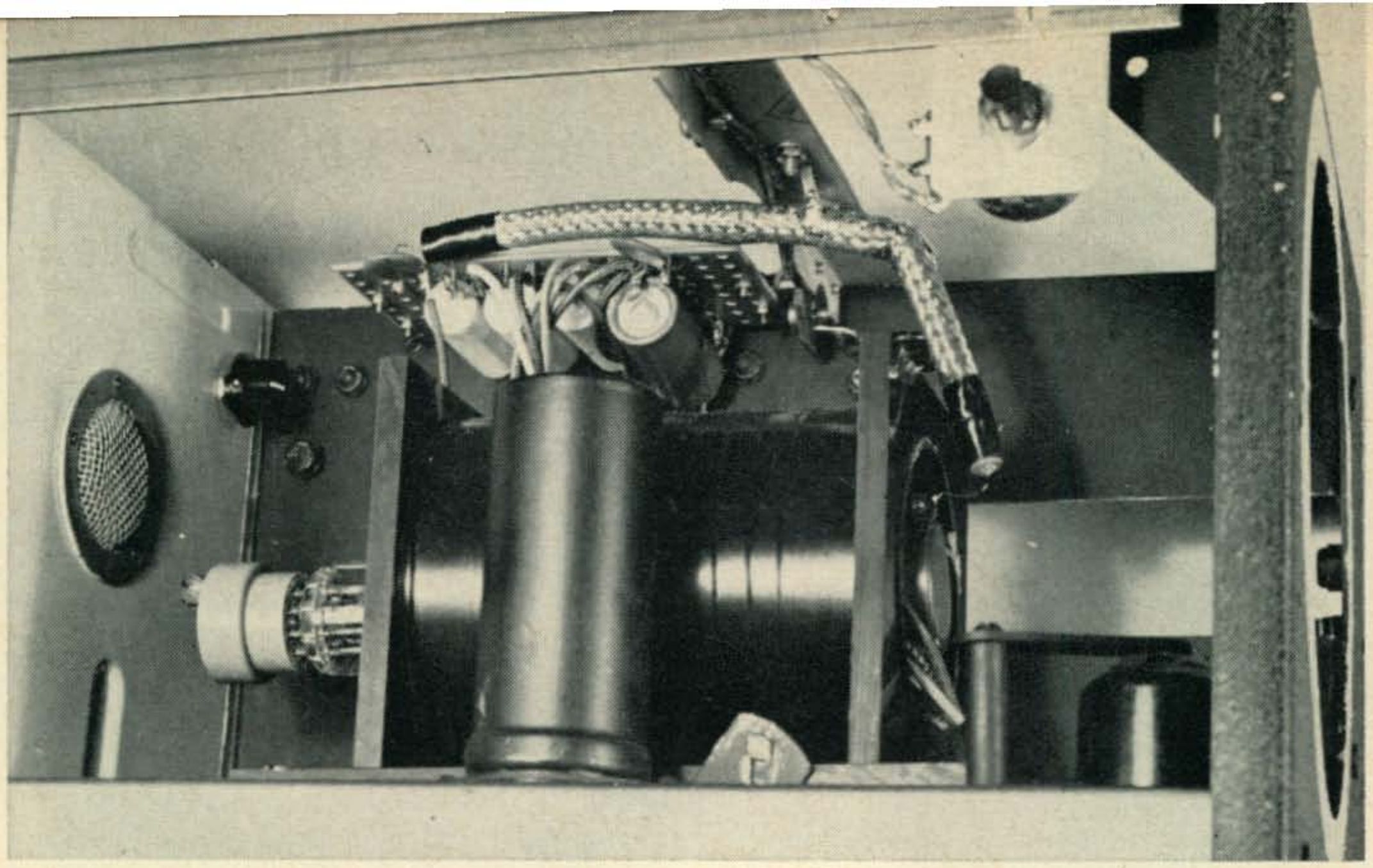
Keystoning and Blanking

The beam-landing characteristic of the offset gun in the 1846 iconoscope required a "keystone" circuit in the original unit which is not necessary for operation of the vidicon. This circuit is eliminated by removing R_{175} shown in fig. 3 and moving R_{137} (the 820K resistor in the horizontal discharge-tube plate) from terminal #2 to terminal #1 of the vertical output transformer, T_{102}.

Because the wire to pin 5 of the iconoscope also carries blanking, it is best to cut the wire at the output of C_{134} (in the plate lead of V_{111}) and feed vertical blanking to the vidicon housing through a low-capacitance cable. This cable

Fig. 4—Partial circuit of the ATK-ATR camera showing the areas of modification discussed in the text. The changes are shown in bold lines.





Interior view of the vidicon compartment after modification. Mounted atop the rear wall is the terminal board described in fig. 5. The low-C cable may be seen connected from this board to the vidicon target. The bias potentiometer is in the upper right of the frame. The leads from the deflection yoke can be seen coming out of the front of the focus coil just below the vidicon camera tube.

can be made by pulling out the center conductor of a piece of RG-8 U cable and pushing a length of #30 wire through the plastic insulation.

Remove C_{107} (the 0.003-mf horizontal capacitor) from its original location (pin 6 of the iconoscope) and solder it between diode CR_1 (at terminal #1 of the width coil) and the output terminal of C_{134}. Both horizontal and vertical blanking are fed to the vidicon by capacitive mixing.

Remove the lead at terminal *D* of the power socket and splice it to a high-voltage lead which is run through the chassis up to the focus coil. Feed another lead from the other side of the coil back to terminal *D*. The B+ line current passes through the focus coil to provide the necessary focus field for the vidicon. Short C_{121} (the 0.003-mf capacitor at the output of the 6L6 master oscillator and heater supply). All changes in the chassis itself have now been completed.

Vidicon Wiring

The focus coil and yoke are already in position; after installation of the bias pot has been completed, make a small terminal-board layout of the filter resistors and capacitors for the vidicon as shown in fig. 5. Install this board near the vidicon. Make an adapter cable from six wires soldered to an 8 prong plug that has a base which matches the old iconoscope socket pins and solder this cable to the proper points on the terminal board. After connecting the vidicon socket to the same terminal board with a short cable, make a contact ring from shim stock for the vidicon target connector. Solder a wire from the target ring to the input of the first video amplifier shown in fig. 4. The iconoscope target clamp which is already in the vidicon compartment is a convenient terminal point for this connection.

The lens for this unit may be either a 35- or 16-millimeter simple camera unit having a suitable mounting bracket.

Operation

The unit is prepared for operation by inserting the vidicon and turning the bias potentiometer to −100 volts, the target voltage to zero, (R_{111})

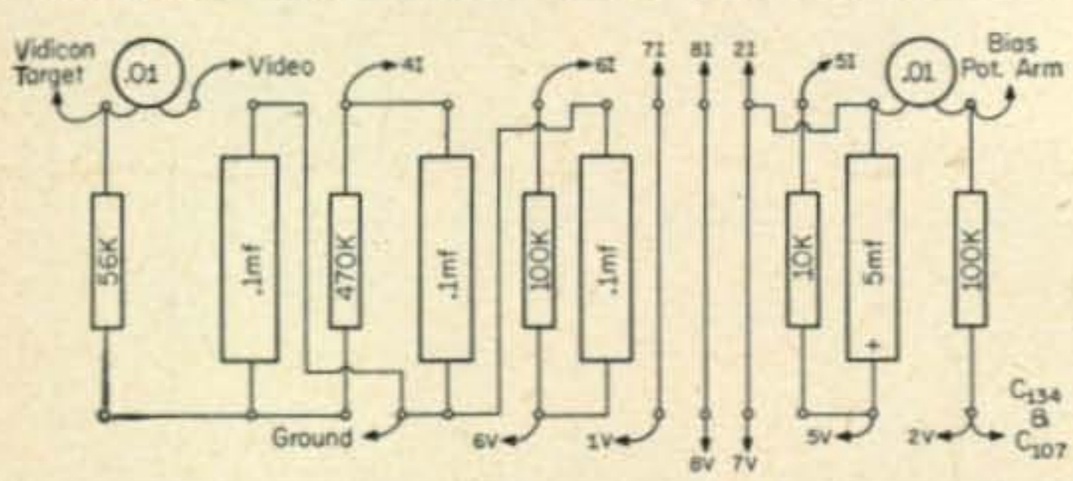


Fig. 5—Layout of the terminal board used to interconnect the iconoscope and vidicon wiring. All numbers followed by the letter *I* connect to the iconoscope socket wiring and all letters followed by the letter *V* connect to the vidicon socket. All resistors are ½ watt and all capacitors are in mf, 450 volts or better.

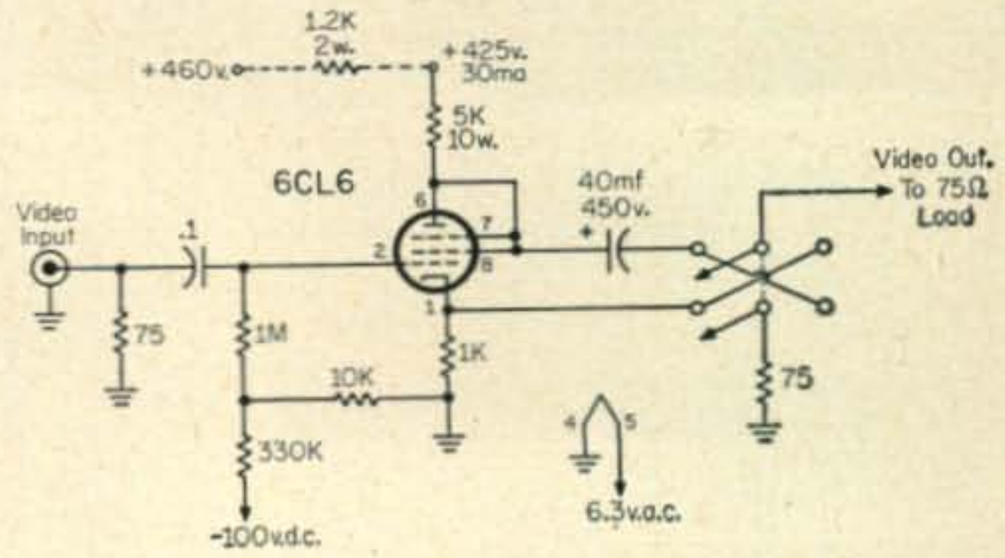


Fig. 6—Circuit of a simple amplifier stage that will permit phase inversion when necessary. All resistors are ½ watt unless otherwise noted.

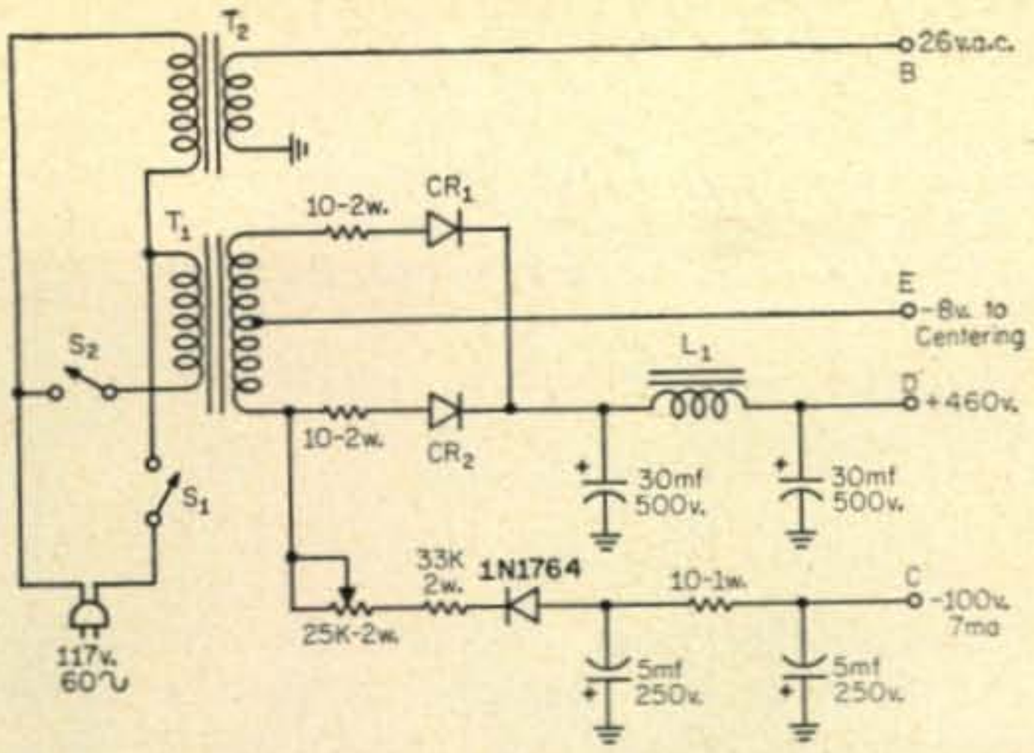


Fig. 7—The power supply circuit above provides all the necessary voltages for the ATK-ATR camera. The outputs are connected to the labeled pins of J_{101}, the power input plug.

CR_1, CR_2—Sarkes Tarzian 120-SM or equiv.
L_1—4 h at 250 ma, filter choke. Stancor C-1412 or equiv.
T_1—800 v. c.t. at 200 ma, power transformer. Triad R-21A.
T_2—117 v. a.c. to 26 v.a.c. Stancor RT-201.

resistance, and the vidicon-heater resistor R_{172} to maximum resistance. Feed the video output through RG-59 U cable to a 75-ohm resistor in the monitor.

If a standard TV set is used for a monitor, it is not necessary to add synchronization, but if the signal is to be transmitted, synchronization can be added by placing an 80 mmf variable ceramic capacitor from the synchronization output to the video output jacks. Video polarity at the output can be reversed, if necessary, by using the simple phase inverter shown in fig. 6.

Power Supply

Connect the power supply as shown in fig. 7, turn the heater supply on and allow sufficient time for warmup. Turn on the plate supply and check the high voltage at the camera end of the focus coil; voltage should be 405 volts ± 2

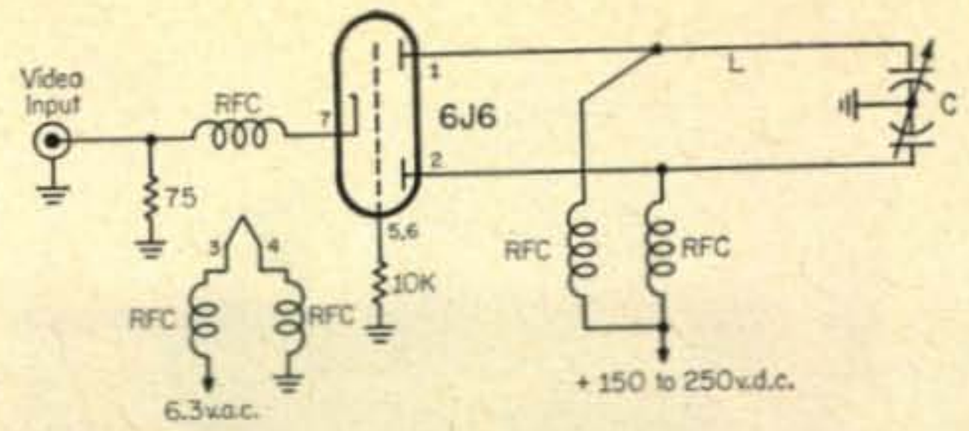


Fig. 8—This simple transmitter will radiate several hundred feet without an antenna. The B plus feed is to the center of *L* which is of #12 wire, 4¾" long, spaced ½". Capacitor C is a Johnson 5MB11. The r.f. chokes are 12t of #18 on a ¼" form or Ohmite Z-436 chokes.

per cent. Adjust L_{115}, then adjust R_{171} until the picture locks horizontally. Turn up the video-gain potentiometer until definite signs of overdrive (tearing) appear on the monitor screen. Back the gain off ⅛ of a turn from this point. Turn down the bias until an image of the target area appears on the screen and adjust the electrical and magnetic focus for optimum results. Point the camera at a subject and turn up the target potentiometer until the image appears. Once again adjust the bias, mechanical, electrical, and magnetic focus and target until a good picture is received. Adjustment of the shading potentiometers will add a final touch.

During these adjustments, the heater of the vidicon is at a low potential; if best results are to be expected from this tube, the heater voltage must be set to 6 volts by connecting a vacuum tube voltmeter across the vidicon and turning R_{172} until the proper meter reading is obtained.

For "on the air" checks, a small TV transmitter such as the 6J6 oscillator shown in fig. 8 provides a radius of transmission of several hundred feet when used without an antenna.

When you have completed this conversion, you will find that your understanding of TV systems has been significantly increased. Also, you can enjoy the pleasures of seeing your self, your family, and your friends on TV. ■

A D.C. Source From the PE-73

BY ALAN M. HANSEL*, KØIQF

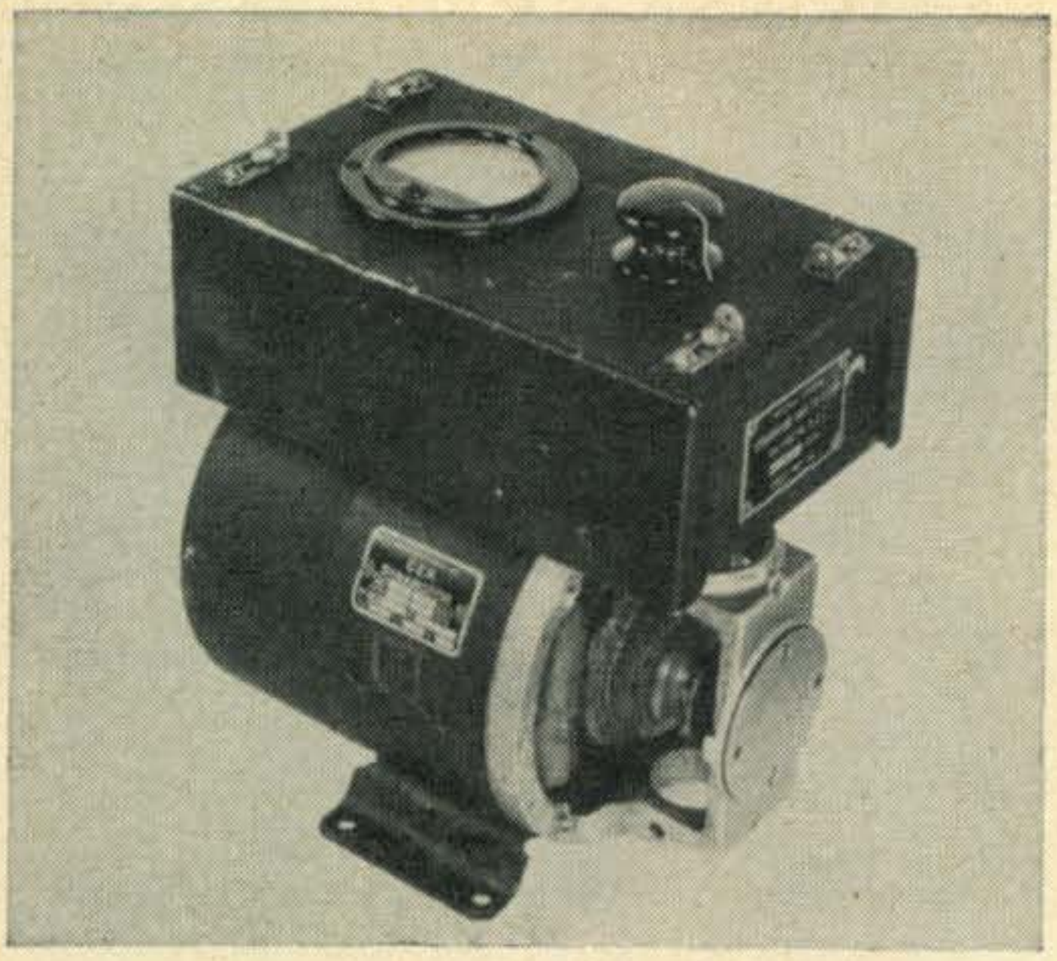
This conversion of the PE-73 Dynamotor provides zero to 28 volts d.c. output when driven by a ½ to one horsepower gasoline engine or electric motor. It may also be used as a low voltage d.c. motor.

HAVE you been looking for an application for those useless 28 volt dynamotors? Can you use a low voltage power supply for field day, a battery eliminator for servicing mobile gear, or a battery charger? Then here is an easy and inexpensive way to fill your needs.

The conversion consists of eliminating the high voltage function of the dynamotor, driving the converted unit with some sort of motor, and extracting the low voltage from the dynamotor input. The conversion was done on several 28 volt PE-73s, but there is no reason why any dynamotor with suitable mechanical construction cannot be converted similarly.

The converted unit may be run with a ½ to 1 hp gas engine or electric motor, and easily turns out 28 volts at 20 amps, or 6 volts at 50 amps. The output voltage is continuously variable from 0-28 volts by the pot in the field circuit. Alternately, if you have lots of 28 volt d.c. around, the converted unit may be used as an electric motor, delivering about ½ hp at 5000 r.p.m.

*1308 SE 7 Street, Minneapolis 14, Minn.



View of the converted PE-73 dynamotor. Note that the end support has been shifted 90° to clear a horizontal drive belt. The field rheostat in the junction box permits voltage output control from 0-28 volts.

The original dynamotor consists essentially of a compound wound d.c. motor driving a d.c. generator. A common armature and field windings are utilized to conserve space. Since a d.c. machine may be used either as a motor or a generator, we will use the motor (low voltage) portion of the dynamotor as a generator in the converted unit.

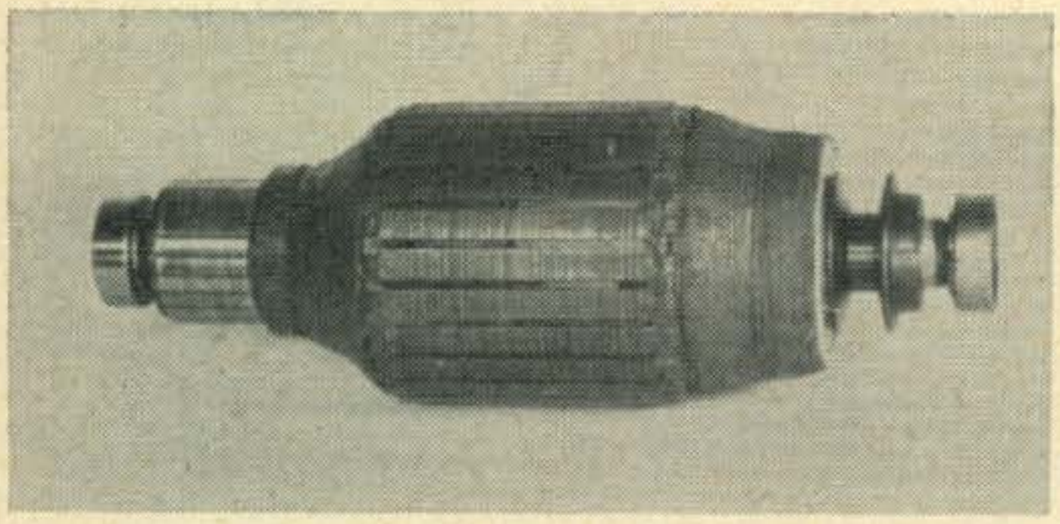
Our aim in this conversion is to attach a V-belt pulley to the dynamotor so it can be turned with a motor. We also wish to provide a means of varying the generator output voltage. These objectives are easily accomplished and the conversion can readily be done in an evening.

Pre-Testing

The dynamotor to be converted should be tested on 28 volts d.c. before beginning the conversion to make sure it runs. High voltage output isn't necessary since we won't use that anyway. Sad experience showed that a few minutes at this point would have saved considerable frustration when one of the converted units didn't work. If you don't have 28 volts available, use 12 volts since most of these 28 volt dynamotors will run, at least slowly, on 12 volts. Also when testing the unit, note the direction of rotation of the armature and mark it on the frame.

Conversion

Remove all of the wiring from the junction box on top of the dynamotor. Take off both end covers and remove the four brushes. Remove the high voltage end framework which supports the armature bearings, and take the armature out of the dynamotor. Remove the brush holders from the high voltage end. This completes the disassembly and brings us up to the mechanical conversion.



View of the finished armature with the V-belt pulley and bearings mounted.

The armature revision requires the use of a metal turning lathe. However, it is not a job requiring precision machine work, and may be completed in about an hour. To protect the bearings, remove them from the armature shaft with a press or a bearing puller. Mount the armature in the lathe and cut away the entire high voltage commutator, down to the ¾" steel shaft that passes through the entire armature, as shown in fig. 1.

After the entire commutator has been turned down, apply some varnish or shellac to the exposed insulation on the end of the armature to seal it against moisture penetration. Install a 1½" diameter V-belt pulley in the space formerly occupied by the high voltage commutator. Press the bearings back on the armature shaft carefully. Install the armature into the dynamotor frame with the pulley at the high voltage end. Install a suitable V-belt on the pulley and put the high voltage end framework back onto the unit, but rotated 90° from its original position (heavy rib vertical). This permits the V-belt to be brought out to the side of the unit without interference from the bearing support.

Wiring

Now look at the wires connected to the low voltage brushes. There is a heavy wire on each one, which is the generator output. Also there is a smaller wire attached to each of the brushes, at least to one of them, depending on the unit you are working with. These are the shunt field wires, and *one* of them should be removed. Splice a 12" piece of wire onto the shunt field wire that was just removed, and attach another 12" piece of wire to the brush holder that the shunt field wire was removed from. Pass the

[*Continued on page 90*]

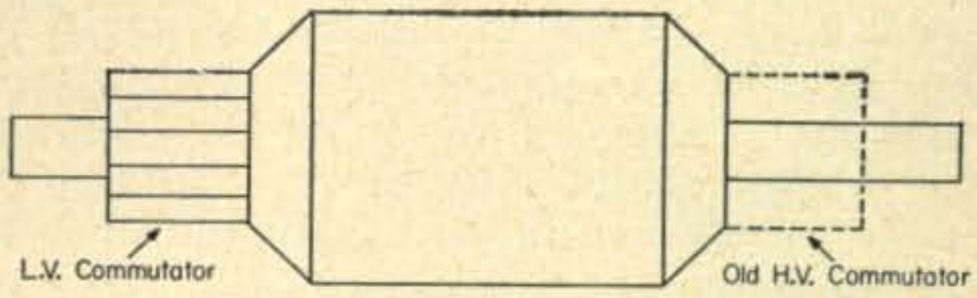


Fig. 1—Drawing of the armature showing the removal of the high voltage commutator which is cut away on a lathe.

Results . . .

1963 Armed Forces Day Communication Tests

ONCE each year the F.C.C. permits cross-band operations between selected U.S. military communication stations and the amateur radio fraternity. This event, by tradition, has been conducted on Armed Forces Day. On 18 May 1963 six military stations in the U.S. were selected for these tests. Each of the three sponsoring services, the Army, Navy and Air Force provided one station on the east coast and one station on the west coast. The east coast stations were WAR, NSS and AIR. The west coast stations were A6USA, NPG, and AG6AA. These stations operated on fixed frequencies outside the amateur bands and conducted the cross-band contacts with amateurs in the appropriate amateur bands from 181500 GMT to 190500 GMT with a break of one hour and fifteen minutes at 190245 GMT. The break was to permit special c.w. and RTTY broadcasts of messages from the Secretary of Defense.

During the twelve hours and forty-five minutes devoted to establishing contacts the six stations made 7,366 individual contacts. This far exceeded the performance of any previous year, and the amateur radio fraternity is to be congratulated for an outstanding demonstration of the military communications potential inherent in their chosen hobby.

Appropriate one-time commemorative QSL cards have been forwarded to each contact that could be identified in the Summer, 1963 edition of the *Callbook*. If you have not received your card for a firm two way contact you should contact the Armed Forces Day Contest, Room 5B960, the Pentagon, Washington D.C. for a clarification. Submit your call, station worked, time and frequency of the transmitting military station.

The messages from the Secretary of Defense were transmitted for competitive purposes. A Certificate of Merit has been issued to everyone who submitted a perfect copy of either or both of the messages. There were 654 perfect entries for the 25 w.p.m. c.w. message, and 583 perfect copies of the 60 w.p.m. RTTY message. Grading is completed and entries not considered perfect have been returned to the sender with an appropriate letter and explanation of the errors.

As always, some perfect entries were submitted without name, address or call. If you submitted an entry and have not received your certificate your entry may be one of those unidentified.

The following is the complete text of the c.w. message followed immediately by station or name of the award winners.

"Throughout this unsettled world today, thinking people are deeply and conscientiously concerned with ways and means of promoting unity and lasting peace between all nations. People who value a peaceful existence for themselves, their descendants and their fellow men cannot help but be concerned. The depth and gravity of their concern is reflected in the effort which they devote to promoting world peace and discovering expedient methods to that end. In your avocation of amateur radio each of you has a unique capability for promoting international goodwill. It is a capability which is informal and personalized in comparison with the sophisticated, formalized methods used in the higher levels of international diplomacy. Nevertheless, it is an important asset in the area of international relations which each of you should, in behalf of us all, use wisely and cherish highly. The ability to communicate spontaneously with fellow amateurs in foreign countries makes you a spokesman, a representative of the Unted States, an ambassador *Pro Tem*. The mutual friendships and goodwill which you can collectively stimulate, promote and increase may well tip the balance permanently to the side of mutual understanding and lasting harmony between all peoples of the world. ROBERT S. MCNAMARA, *Secretary of Defense.*"

C.W. Certificate Winners

W1BDI, BGW, BMW, CBT, CMI/MM, CMW, ECH, ELL, IIB, IUY, JNA, JOW, JPD, KMH, KQK, KQY, KYT, LZL, MC, MD, MEG, MIP, OPZ, QVK, SAD, SGU, SWX/1; WPR, ZAD, ZYO/6, **K1**AAA, GRS, NOW, QDN, RPZ, RYP, SDX, TFV, USN, YQZ; **WA1**HJP; **KN1**YRP.

W2BVE, BXW, CLQ, CLX, GKZ, GQN, HQL, HX, JCA, JZG, LRW, LYH, MFB, MPM, MZB, MZV, PKY, RJ, RUK, RUZ, SKX, SWC, TAP, TUK, YJS, YQK, ZDD, ZMK, ZUX; **K2**CJP, DDE, EEA, EQP, JMI, JWD, LBB, MTW, QDG, SAV, UGZ, UTU; **WA2**CKL, DEX, EXP, FQW, IKT, KFT, KHV, KIP, MYS, NMK, OWQ, PFZ, SRR, TAF, TEA, TJA, TKL, TNT, VSQ, WJX, WKK, ZGP, ZPR; **WB2**AAY, AVK, CDB, DLW.

W3ADE, AX, BFF, BHK, BKE, BUR, CA, DZL, ECP, ELI, EOV, IRS, IVC, JHR, KGB, LCB, LIV, MCG, MGU, MNE, MWV, PIT, RKF, SCH, SXL, UQX, UYN, WZC; **K3**CFR, EZJ, GOH, HTZ, ILC, JSK, JSX, LYW, MKZ, MNT, MTT, ODA, OTQ, OHR, OKJ, QXS, TLX, UPR, USH, VIV/1; **AG3**BA.

W4ABY, ADN, AGV, AIY, ARH/6, CCC, CXY, EFV, FAS, FRO, GM, GNU, GPH, HOS, HXW, JJT, JJU, JLA, JRA, JYR, KFC, KH, KR, KLT, KVO, LYW, MHW, MKU, NPG, OBA, PCN, PQL, PUI, PVW, RRC, SLJ, SZZ, UUI, USA, VAY, VHX, WHK, WQQ, YE, YPG, ZJO; **K4**AO, BAI, BP, BVD, DAH, FJH, GFL, HOE, JKK, KHT, LWL, NHR, SCT, WH, YRJ, ZSX; **WA4**AGT, CAW, CTD, EMY, FRW, IJH, ISM, JWV, KPP, LUO, NDM.

W5AFK, AHC, AIR, AJG, BW, CCF, CCK, CEZ, CVF, DWB, DXX, FIV, HNF, MFX, MSX, NOP, QOX, QVZ, SQB, SYX, TZR, UPM, UY, ZU; **K5**CAT, GCK, JGZ, QVH, RRZ, SBT, SGX; **WA5**CTW; **A5**ARK, RCE; **AF5**BMI; **WN5**ERR.

W6AAQ, ASH, AXV, BHG, CBX, CG, CGJ, CHL, CKU, CLB, CLY, CWF, DHX, ELT, FHI, FLW, FNG, FYW, FZC, GUQ, GYH, HPE, IQ, JKI, KBT, KTT, MFH, MMG, MNN/4, MXO, NAZ, OFK, OJW, OWP, QIL, QQ, RDF, RGG, RXT, SAW, TDC, VHN, WPF, WNZ, WX, WXZ, YJU, ZF, ZLF, ZPX; **K6**BPI, DCF, DV, DYX, EA, EEZ, GK, GTP, GZ, HDJ, IMJ, KUQ, LKD, MTX, OGE, SWL, SXX/4, TTH, TWE, VCT, VYJ; **WA6**CFT, CMK, DFW, DZM, ERU, FKN, HNZ, JSA, RGD, VGE, WMD, ZNY; **WB6**BIG, EUJ; **AA6**CB; **A6**FB.

W7ADT, ADY, BJY, DAN, DIS, DLR, EYF, FBP, FIX, FKK, FOS, FPP, HRM, JMH, JPN, JU, KX, LNG, LPM, MCU, NGW, NWK, PGY, REZ, RGD, SFF, SMR, SU, ZT; **K7**BVZ, EWZ, EXT, KJH, KYG, MTZ, NHG, NHV, OGF; **AA7**NWA.

W8AHO, APZ, BTW, CJN, CLX, CYN, DAE, DJD, DUV, FLA, FVP, GMX, FFK, FSR, HOV, HZA, IRN, JUE, KYW, LEX, MHP, MTI, NEM, NOH, OMY, OOK, ORP, PHM, QWE, QLJ, RLR, SQU, TZO, VMP, VPC, YCP, ZEP; **K8**AIR, DDC, DIU, EEB, EQN, ERZ, HKU, ITH, JIC, KIR, LXI, QCU, RYU, VWM, WBC; **WA8**BAG/4, DSB, ENO, EZW.

W9API, ARM, BMJ, BRY, CHD, EGR, ELM/4, GSJ, HTO, HUZ, IDO, IFS, IMN, ITV/9, IXA, JAM, JOT, JYO, KCR, LRV, MIU, MWQ, NGP, ONI, OQY, PNE, RGU, SZR, TGB, TT, VHD, VNN, WBE, ZEN; **K9**ARW, DHN, DHR, DOL, FOQ, GDF, GSK, IZD, KCQ, NBH, QOV, UTQ, UUT, VPL/6, YMU; **WA9**DHI; **WN9**GQC.

WØAH, BES, BHA, FDJ, IJW, JHY, KIS, LJO, OKH, RGS, WWI, ZWK/6; **KØ**CST, IHD, JPJ, JRU, KPU, RAL; **WAØ**DJG; **AØ**CEC.

KH6AO, BGW, BLT, BZF, DVD, DUV, EGF, ELW, EVU, FX, UK; **DL7**JY, 11GO, VE2HY, 3BAQ, 5VV, 7JM.

R. S. Alcorn, S. Anderson, G. W. Arvidson, R. L. Aylsworth, G. G. Bachman, T. H. Badger, D. E. Baker, J. E. Ballard, G. J. Berger, T. L. Bever, F. C. Beyer, F. J. Billmaier, R. H. Blessing, O. C. Bonin, K. Brown, R. G. Brown, L. J. Bradshaw, R. M. Byrd, J. Cardoza F. Carlson, H. R. Carlson, H. A. G. Castillo, G. R. Cason, E. A. Coleman, D. L. Daniel, G. Deebel, R. E. Davis, S. A. De Velvis, A. Dolack, Jr., G. O. Dunklee, A. L. Edmondson, F. R. Elliot, J. R. Engelhardt, D. L. Eskildsen, E. F. Fahey, Jr., D. P. Ferguson, R. L. Fish, J. L. Fissel, S. L. Fletcher, A. Fontillas, P. H. Furlough, J. K. Gaff, E. D. Garand, J. E. Garza, M. R. Haack, L. D. Hagan, J. W. Havery, H. G. Hayes, R. Herron, J. T. E. Hinkel, A. J. Holtzman, R. A. Hickman, G. O. Holum, J. A. Howell, R. A. James,

B. W. Johnson, J. E. Kelley, T. H. Kesinger, C. E. Key, J. C. Kilgore, W. A. King, J. L. Knight, P. D. Kroll, D. Kushman, L. Kwant, J. J. Lapham, Jr., K. B. Lawton, J. D. Laycock, C. R. Lewis, H. A. Long, Jr., M. D. Lyons, J. W. Massey, H. M. Matthews, Jr., F. E. Maughan, R. N. McCormick, C. W. Meeks, F. D. Miculka, J. F. Mikkelsen, D. W. Miller, L. Mohler, J. C. Moore, C. L. Myers, D. T. Nelson, J. L. Norman, R. G. Nunnelley, R. Olivares, E. L. Parker, C. W. Parish, D. R. Peterson, A. D. Pinney, Jr., J. J. Rainey, H. J. Rausch, W. A. Rigling, Jr., W. H. Rigney, Jr., F. D. Robinson, R. M. Robinson, J. D. Rouse, K. Schroder, E. R. Seidler, G. A. Shaffer, M. Solomon, C. D. Spier, C. M. Stanley, C. W. Stout, W. S. Sullivan, D. M. Tripp, S. M. Udell, J. A. Ungari, J. Wagemans, L. W. Wheeler, L. R. Winchell, R. W. Woodard, J. L. Zimmerman.

The complete text of the 60 w.p.m. RTTY message is as follows:

"On this 14th anniversary of Armed Forces Day the Military Communications Services of the Department of Defense extend greetings to all amateur radioteletypewriter enthusiasts. Those of you who have built, assembled and are operating the equipment necessary to communicate by radioteletype possess a high degree of technical ability which is self evident. It is a technical ability which is born of the true pioneering spirit, an adventuresome spirit which is generated by an inherent individual desire to explore new horizons. In exploring, developing and adapting radioteletype communications for amateur use you have improved and increased your technical ability. In assisting other amateurs in this endeavor you have contributed to the technical advancement of amateur radio as a whole. depends largely upon the technical efforts of such people as you. It is you who will be the most versatile, who will contribute the most in communications emergencies. It is you technically proficient explorers who, by deed and accomplishment, will brighten the historical pages of amateur radio communications progress. ROBERT S. MCNAMARA, *Secretary of Defense.*"

RTTY Certificate Winners

W1BGW, FGL, GWW, JRV, KAY, KQY, LWV, MCG, MEG, MFJ, MX, OMN, OUG, SGU, TLZ, UHE; **K1**AAA, BIM, DVI, NAN, NNC, OCS, RPZ, USN, YZG; **WA1**HJP.

W2ABV, BVE, BWN, BXW, BZA, DLT, EW, EXB, FAN, GQN, IGX, ISK, JAV, LBO, LBX, LVW, MFB, MZB, NRQ, OKO, ORX, ORY, PEE, TAM, SUC, SUH, UUI, WNW, ZMK; **K2**AJG, AMI, AXM, CUI, DDE, EQP, GYX, HAC, JTU, MAT, MTW, OWC, OWD, OYW, RJF, SDR, SQL, YCQ; **WA2**CKL, ELE, GSV, HOH, IKL, KFT, LKF, PFN, WWF; **WB2**BDT, CVN; **AA2**HOS.

W3BBV, CA, CRO, DJZ, DTH, GUS, HIX, IDO, IZT, JNE, JRV, KMH, KQE, MHD, MWV, NNV, NSI, TDU, UCY, UDG, VVP, VYY, YC, YRB; **K3**ADS, BEG, BHK, CES, CKB, DDW, ECF, GGQ, HGM, IDO, IQQ, JSK, KVS, LLI, MYW, QBA, UPR, ZVJ; **A3**EOV, SXL; **AA3**HIJ; **AF3**KNH.

W4AIS, AIY, AWY, BOC, CAL, DDQ, DYE, EBH, FJ, GJY, HAG, HHH, IAA, IET, IPL, ISM, KH, KLT, KR, KZF, MDS, NTK, NZY, OSC, RDE, RHZ, RWM, TQD, UFQ, ULM, UNA, USA, VEY, VHX, VUE, WQQ, YPG, ZZV; **K4**DTQ, EID, HAO, HNT, IKK, JKK, JXG, MKO, MKQ, PAN, LQH, TGZ, TKU, UMK, VYX, YTB, ZSX, ZVQ; **WA4**AOM, BDB; **A4**BCO; **AA4**CEK; OHL; **AD4**DQQ.

W5AJG, ANH, BHO, DKK, DMM, EDZ, EUT, FCP, FHW, HCS, LDU, LHX, QJD, SQB, TBV, WUU; **K5**BQA, BTZ, CIL, DNH, JIC, LEP, LFS, MBB, OMQ, RAV, RDP, SGX, UY, VHM, YWX, ZXG; **AF5**HXW; **KN5**UWE.

W6ACN, AXV, BEG, BHZ, BIK, BNO, CAL, CBX, CEM, CG, CUV, DHX, DNJ, DOU, ECP, EFM, EGZ, FLW, FYZ, FZC, GEB, GGC, GYH, HKB, HTS, HXQ, JOZ, KNI, LDG, LFF, LKU, LX, MAP, MTJ, MZO, NSS, OWP, PRY, PSW, QID, QKN, RGG, RMM, SCQ, SYI, TDC, TFH, UGA, VVF, WLI, WPF, ZVV; **K6**ARR, BPI, CCJ, CUO, DX, DYX, EER, EPT, ESZ, FDD, GXT, GZ, HWL, IBE, ITY, JDN, JWS, KFF, LIK, MDD, MYH, OEH, OWQ, QKY, QMJ, QQV, RBB, SBL, SEA, SHZ, TEN, UCT, WBC, ZVC; **WA6**AMP, AVJ, CDV, DTH, DZM, FKN, GHC, JSA, JXW, LZB, MQL, MRK, NDZ, OXR, PDQ, PLV, SWA, VGE, VVR, YQI, YZO, ZCA; **WB6**AOG, CLR; **WN6**AGM; **A6**AEE, ASH, GCG, NQH, PDD, USA; **AA6**EPT, SHZ; **AB6**USA; **AD6**DFT; **AFA6**ZYU; **AFB6**FIX, LUM.

W7AUK, BEG, CTK, EQU, ESN, FEN, FKK, FPH, FQW, GHS, GTP, JMH, JNS, LI, LNG, LPM, MCU, MEV, OHI, PGY, PHG, PRG, RGD, SMR, SCT, TYR, VPH, VZX, ZT; **K7**DPO, IAP, LRK, LRV, NKH; **A7**MUS, PBV; **AB7**WAF; **AF7**CGA, EXF, JWF.

W8AIC, AYY, CLX, CMH, CRY, DIE, DPW, EMO, FEU, FEV, GMX, HPR, IMK, IND/2, KJK, KXD, LBI, LEX, LGL, MGG, MTI, NIY, OMY, PHV, PQQ, QCU, QWE, SWC, TV, VMP, YFX, ZCK, ZEP, ZYW; **K8**AIR, AIZ, COI, CLX, CTI, DXB, EJI, ENX, FCI, FVP, HTS, IPM, INR, JHA, JIC, JON, LGI, LXJ, RJI, SOE, SXE, WNE, YCQ. YEK, YFV, YIF, YJQ; **WA8**GWK, TZO; **A8**GKN.

W9BMJ, CUW, DGV, EPT, FAA, GDW, GSJ, HRH, ITY, LNH, ONI, PFK, PUU, RGU, TVN, UMJ, WBE, WKM, WMR, ZGC; **K9**BRL, CCX, CMX, DOL, EHP, EYY, MVJ, OJQ, PRD, QYY, RDD, SQV, UHR; **AA9**PZP.

WØAJL, AUS, BBA, BDZ, BHA, CHV, DEL, EKJ, FAH, HAH, HVA, HVY, JHY, JQQ, KIS, LFH, LQV, OKH, RWG, RWH, SYN, TUH, UMG, WWN, YTQ, ZFN; **KØ**CGP, CZO, FLK, GXL, HZO, IEB, IQR, MAL, OXK, OYI, PHD, YWT, ZQD; **AFAØ**HLC; **NØ**AQJ, ATZ, RQR.

J. H. Barnes, O. C. Bonin, U.S.S. *Boston*, D. R. Cason, COMCRUDESFLOT 3, C. F. Cook, Base Comm., 29 Palms, Calif., A. Dolack, Jr., W. H. Elkerton, E. F. Fahey, Jr., W. A. Farnsworth, A. J. Fulkerson, D. J. Goodman, M. R. Haack, H. Hammer, G. R. Hermansen, J. E. Hicks, III, H. L. Holton, D. Hoyt, J. J. Humphrey, Jr., J. P. Humphreys, III, J. D. Laycock, P. T. Menadier, D. Mendoza, N. G. Newnham, NAS, San Diego, Calif, NRSG 4-6 USNRTC, R. Olivares, T. M. Pfeiffer, H. Phillips, III, M. W. Reisen, C. E. Roberts, Jr., J. D. Rouse, E. R. Seidler, M. H. Smith, R. B. Smith, M. Solomon, J. E. Stewart, S. M. Udell, L. R. Winchell, Jr., H. W. Zuelke.

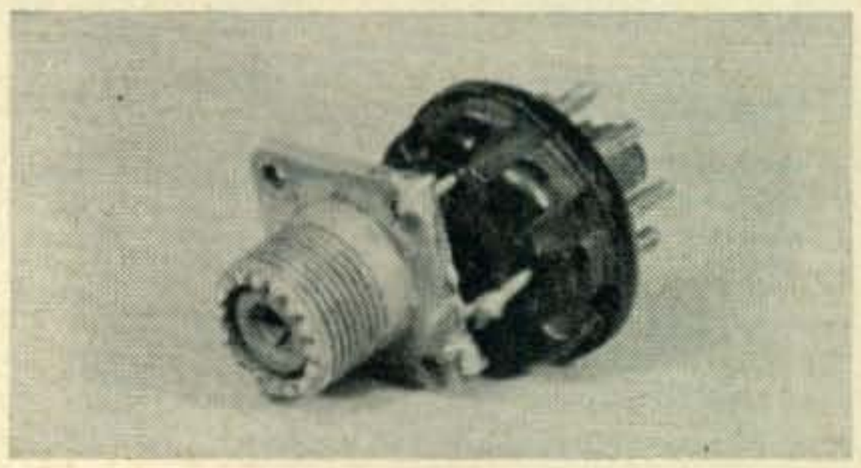
If you did not receive the one time QSL card or missed one of the certificates, plan now to participate in Armed Forces Day next year. Plans are already underway for 1964 and it is hoped that the amateurs will once again demonstrate to the world that they can provide he necessary backup for our nation's communication needs if and when their services become necessary. ■

A V.F.O. Adaptor

THE less-expensive kit transmitters commonly use an octal tube socket for crystal and v.f.o. input. Ordinary FT-243 crystals easily fit the socket, their pins having a spacing equal to "every-other" octal pin. The v.f.o. output, usually being coaxial, poses a problem.

The amateur can wire coaxial cable into an octal plug, but then it becomes difficult to use the v.f.o. with different model transmitters.

Few amateurs know that the spacing from the center pin of the SO-239 (Amphenol 83-1R) coax receptacle to any of its four mounting holes is very near the 0.485 inch spacing of crystal pins. Thus, two stiff pieces of bus wire can be soldered directly from the center and one mounting hole of the coax receptacle directly into an octal plug such as the Amphenol 86-CP8.



Soldering to the pins of the octal plug will require much heat or will require internal pretinning. A solder pot made of an inch-long piece of ¼ inch copper tubing (pinched closed at the bottom) makes the job easier. Either gas flame or a heavy soldering iron (100 watts or more) will heat the "solder pot" nicely.—*WA2ANU*

The Workman Model BX125 Transverter. It supplies 125 watts of 117 volt 60 cycle a.c. from a 12-volt d.c. source. The power line cord is equipped with a cigar-lighter type plug for convenient installation directly into the lighter receptacle of a vehicle.

CQ Reviews:

The Workman Model BX125 Transverter

ONE of the most useful devices is one which may be plugged into the battery system of an auto, boat or other vehicle to supply power for a.c. operated equipment such as amateur, Citizen Band and Civil Defense gear, grid dippers or other test equipment, portable a.c.-d.c. radios and TV sets, record players, tape recorders, p.a. systems, electric shavers, soldering irons, trouble lights, *etc.*

One such device is the Workman Model BX125 Transverter, a transistorized d.c. to a.c. converter which supplies up to 125 watts of 60-cycle 117-volt a.c. power from a 12-volt d.c. source. It is a completely assembled and wired unit, ready to go simply by plugging it into the lighter receptacle of a vehicle.

The Workman Transverter uses a d.c. switching system employing four power transistors (2 each in parallel) in a common-collector circuit. The transistors are mounted on the sides of the sturdy case which provides a heat sink for them and positions them to take advantage of some degree of air cooling. Two controls are provided. One is an ON-OFF switch, the other is a load adjuster, use for which will be shown later. The d.c. line power cord is equipped with a cigar-lighter type plug and a standard type a.c. outlet is mounted on the case.

Installation and Operation

The input-power plug for the unit is wired for a negative-grounded 12-volt battery system, but if the positive side of the battery is grounded instead, the plug connections may easily be changed accordingly, by simply reversing the removable leads from the plug. Both the plug and power leads are marked for polarity, so no mixup as to their identity should occur.

When a device of this sort is plugged into a lighter receptacle, a good electrical connection should be assured by making certain that both the receptacle and the plug contacts are clean and fit tightly together. Failure to do this may result in burned contacts, resulting in poor efficiency especially if the equipment is used continuously over long periods of time.

After the a.c. equipment is plugged into the Transverter's a.c. outlet, the load control is set to position 3, the lighter plug on the d.c. power cord is inserted into the lighter receptacle and the power switch is turned on. If the a.c. equipment does not function properly, as could be experienced with recorders and record players running at the incorrect speed, the load control must be adjusted for best performance. When light bulbs are used, it is adjusted for their maximum brilliance. This control varies the a.c. frequency and the output potential slightly.

Performance

One of these units was operated for an hour using a maximum continuous-rated load of 125 watts. No excessive heating of the transistors was experienced. With this load an input of 13 volts d.c. was needed to produce 115 volts of a.c. output, while 12 volts input resulted in 105 volts output. Smaller loads will produce a higher output for a given input. In this connection, it might be well to point out that to avoid running down the battery with heavy loads, the motor should be turned on, where possible, to keep recharging the battery, during which time the potential will be 13 or more volts. The no-charge amount, of course, will drop down to near 12 volts.

Operation was found satisfactory with reactive as well as resistive loads. Efficiency averaged near 80%, depending on the magnitude of the load. Intermittent use with a 150-watt soldering gun produced no deleterious effects. Reception with a communications receiver was found to be quiet and free from power-supply interference as otherwise experienced with some systems.

The size of the Model BX125 Transverter is 5¼" × 5" × 3¼" and it weighs just slightly over four pounds. It is moderately priced at $29.95 and is manufactured by Workman Electronics Products, Inc., P.O. Box 5397, Sarasota, Florida.—*W2AEF*

Lil Lulu is a small and neat a.m.-c.w. 6-meter transmitter with a v.f.o. A built-in power supply operates either from 117 volts a.c. or 12 volts d.c.

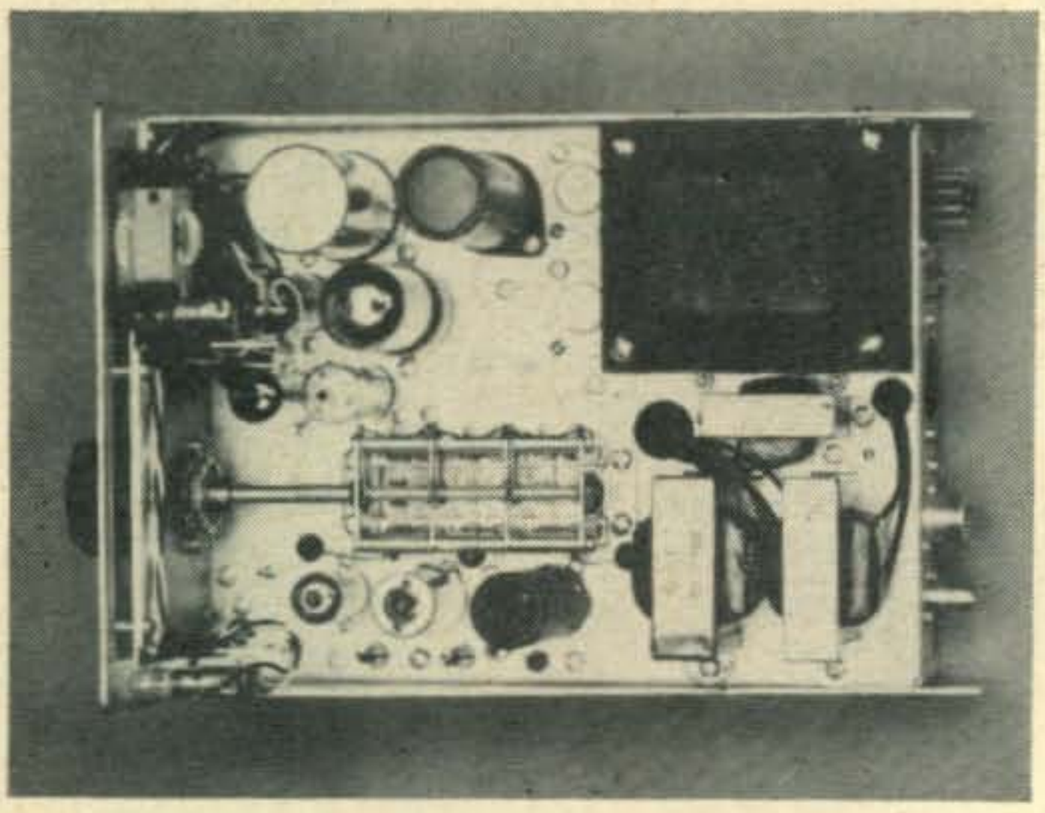
CQ Reviews:

The Lil Lulu 6-Meter Transmitter

A FEW years ago Ed Ladd, W2IDZ, designed and built a compact low-powered a.m./c.w. 6-meter transmitter which had a number of nice features for varied applications. It was not long before other 6-meter enthusiasts, seeing the results obtained with W2IDZ's unit, built duplicate rigs and, in a number of cases, their construction became club projects. Ed had no special name for identifying the transmitter; however, it was soon known as Lil Lulu, since those who used the device so often remarked, "She's a lulu!"

The success and popularity of Lil Lulu prompted the Whippany Laboratories, Inc. to manufacture similar units. In addition, the manufacturer decided to produce them as high-quality pieces of gear.

Lil Lulu features the following: v.f.o. covering the entire 6-meter band; regulated plate and heater potentials for v.f.o.; driver and final gang-tuned with v.f.o.; 5 watts carrier output on a.m. (20 watts p.e.p.) with 6 watts on c.w.; low-pass output filter; plate modulation; c.w. keying with wave shaping; self-contained power supply for either 117 v.a.c. or 12 v.d.c. operation; two-stage mic amplifier with either carbon or crystal mic input with push-to-talk provision; antenna changeover relay; output meter; power outlet with muting circuit for separate receiver; small size—ideal for fixed or mobile station use and is ruggedly built with the highest quality components obtainable.



Top view of Lil Lulu. Note the neat layout. The three-section variable capacitor tunes all stages together with the v.f.o., eliminating the need for retuning with frequency changes. The power transistors, for 12-volt d.c. operation, are in front of the power transformer.

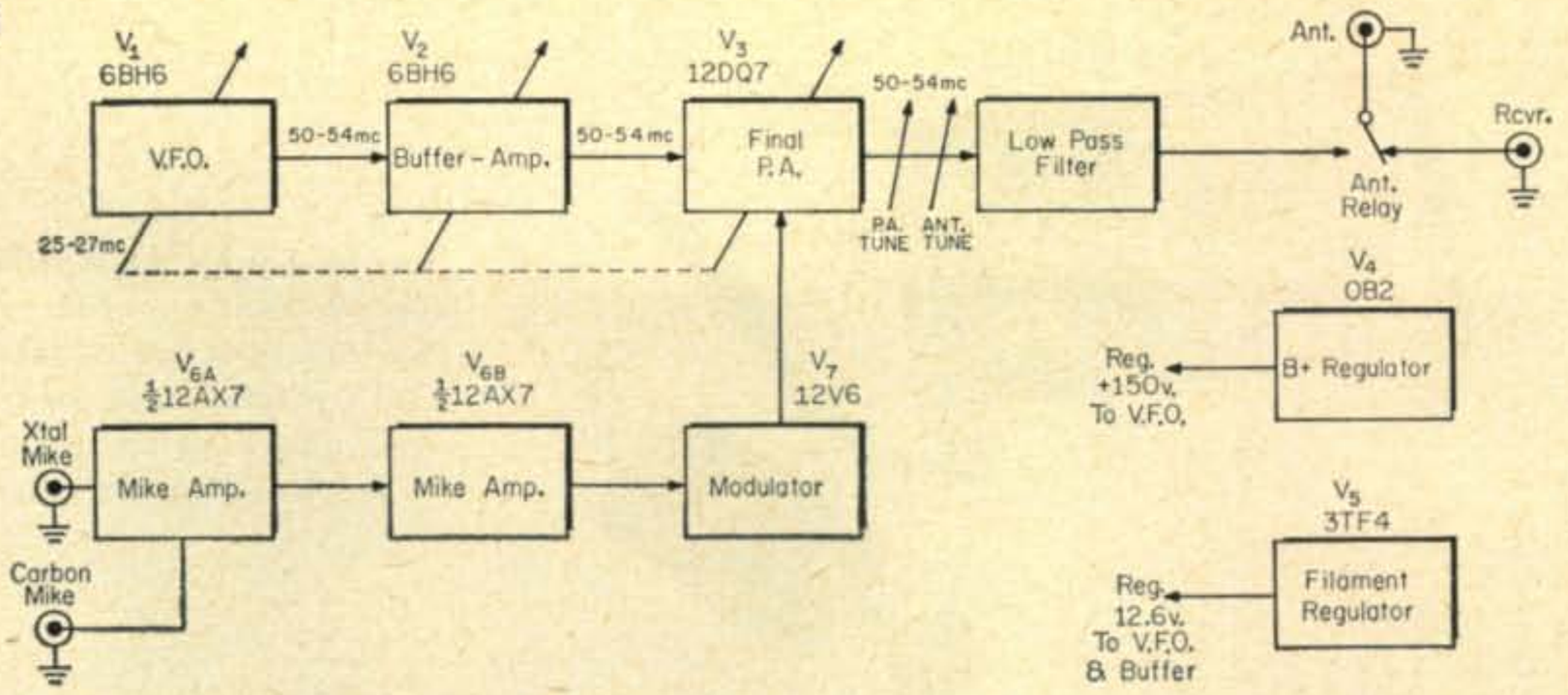
A block diagram is shown in fig. 1. The v.f.o. uses a 6BH6 pentode electron-coupled oscillator, the plate section of which doubles into the 50 mc band using a broadly tuned circuit. This is followed with another 6BH6, an amplifier/buffer, which drives the final to an output of approximately 5 watts. An unusual feature is that the v.f.o., the buffer and the final are gang-tuned together, thus eliminating the need for retuning as the frequency is varied. Regulated B plus and heater potentials are used for the v.f.o.

The final amplifier is link coupled to the antenna circuit through a series-tuning capacitor which serves as a loading control. Another feature is the inclusion of an excellent low-pass output filter to minimize the possibility of TVI.

A changeover relay switches the antenna to the transmitter or to a coax receptacle on the rear apron for receiver use. A standard type PL-259 connector is used for the antenna and a type BNC is used for the receiver connection. The two different type connectors make it easier to identify the desired one, especially with mobile installations where it often is necessary to feel around in the dark for the right terminal.

For a.m. the final is plate modulated by a single 12V6 which is preceded with a two-stage speech amplifier consisting of both sections of a 12AX7 dual-triode. Two mic jacks are provided. One feeds directly to the grid of the 1st

Fig. 1—Block diagram of Lil Lulu.



a.f. amplifier for use with a crystal or high-impedance dynamic mic. The other jack is for use with a carbon mic and is connected in the cathode circuit of the 1st stage from which current also is obtained for the carbon unit. Both jacks are the three-way type and provide push-to-talk operation with the mic button.

The cathode of the final is keyed for c.w. A wave-shaping circuit is used which improves the keying characteristics and eliminates key clicks which might otherwise cause TVI on adjacent channels. The key jack is located on the rear apron.

A frequency-spotting switch enables the operator to "zero-in" on frequency without swishing a signal over the band on the air. A panel meter indicates the transmitter output and so is used during tuneup.

The built-in power supply operates from either 117 volts 60 cycle a.c. or 12 volts d.c. When a.c. is used, the line power is fed directly to primary No. 1 on the power transformer. For 12-volt operation the d.c. is converted to a.c. by means of a transistorized switching circuit and is fed to primary No. 2 on the transformer. Two separate power cables are supplied, one for 117 v.a.c., the other for 12 v.d.c. With the latter, either a positive or negative grounded system may be used, for which the interconnections on the cable plug must accordingly be made. Power for a separate receiver also is available from a rear apron receptacle and is transferred between receiver and transmitter through auxiliary contacts on the antenna relay.

Operation and Performance

Lil Lulu is easy to tune up. This is done for a maximum output reading on the meter, after which the transmitter is ready to go on any frequency to which the v.f.o. is set. Tracking of the ganged circuits is remarkably close, with constant output maintained as the v.f.o. is tuned across the band.

With a.m., the setting of the panel gain control determines the percentage of modulation. There is no sure method for checking the degree of modulation, although the instructions specify the mic level to be raised to the point where the output meter starts to flicker. It was found that considerable over-modulation was required before the meter responded noticeably. With a crystal mic the gain setting will be around 9 o'clock. In any event, it is best to check the modulation level with an oscilloscope.

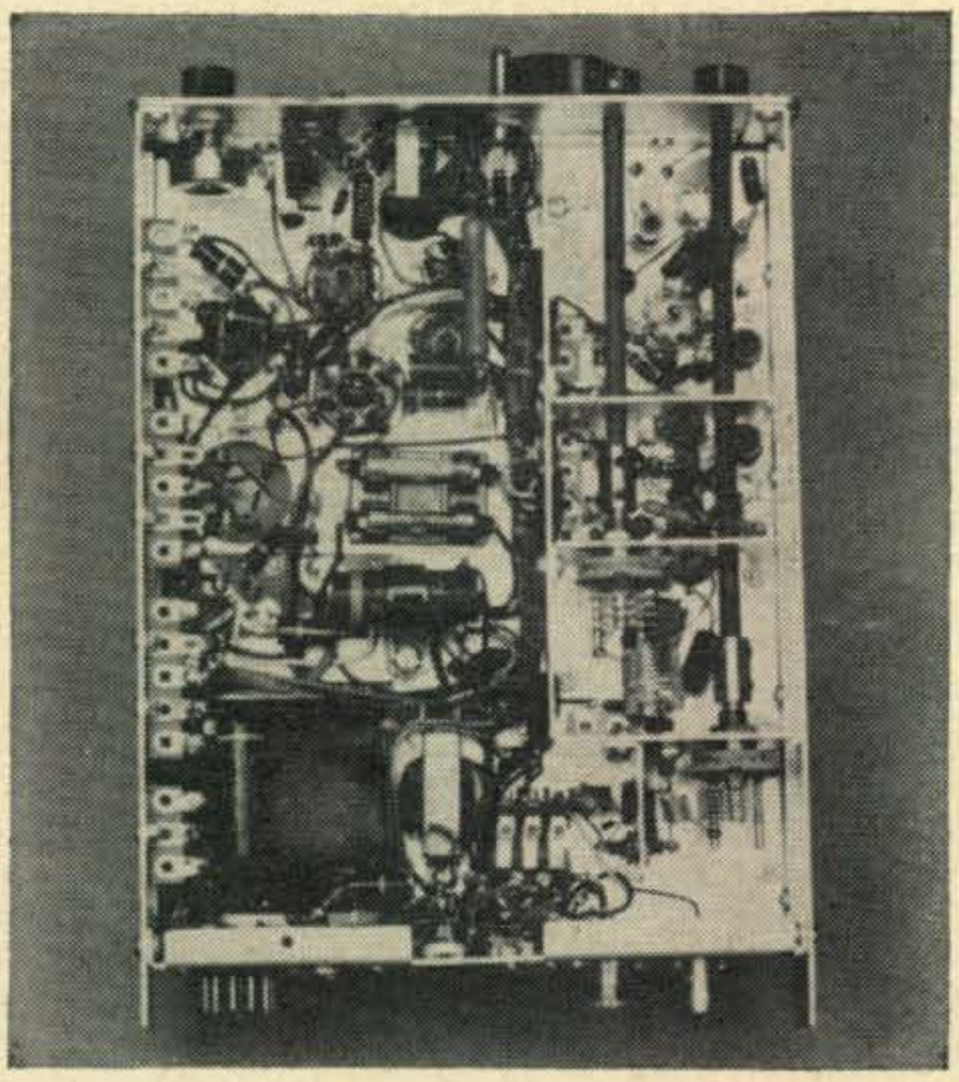
Such visual observations indicated that the modulated r.f. envelope tended to square off above 90 per-cent modulation; however, splatter was not noticeable at the 100 per-cent level where the a.f. quality sounds clean, is pleasant and carries a good punch. The carrier output was measured about 15% lower than the manufacturer's rating.

C.w. keying produces no sign of key clicks, but some keying chirp was evident.

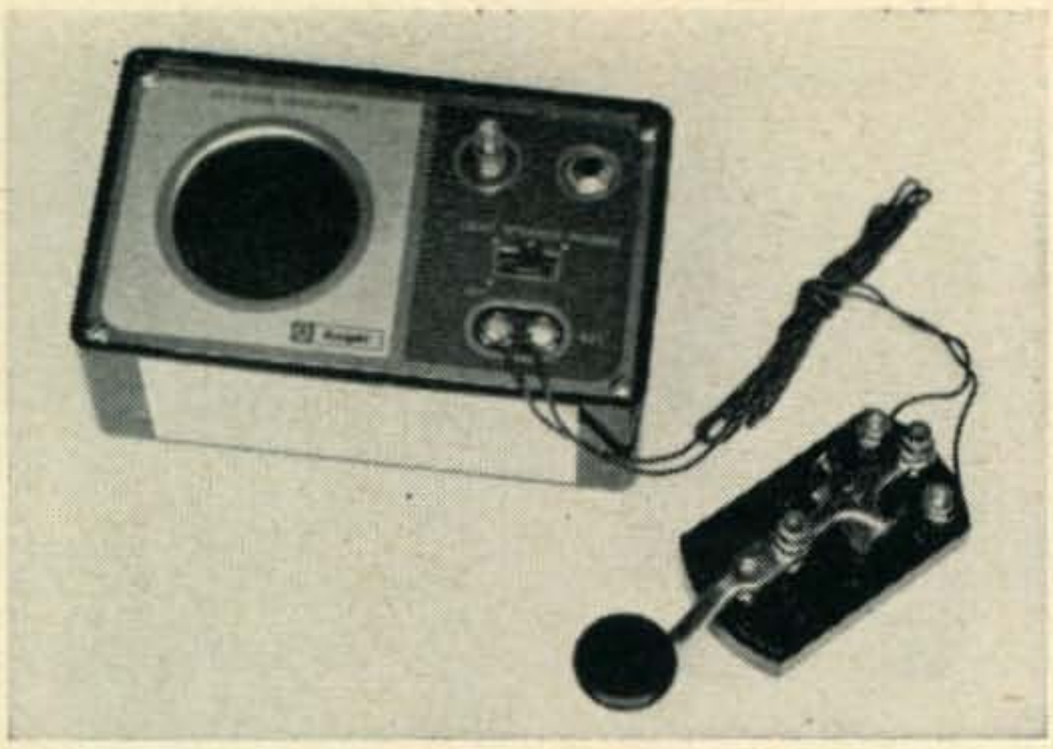
As far as drift is concerned, the frequency stability was found to be 3 to 5 kc (depending on the starting ambient temperature) for the first 15 minutes of operation and approximately 1 kc per hour thereafter, this being close to the manufacturer's specification. Subjecting Lil Lulu to vibration indicated frequency flutter which would not be of serious concern with a.m., but might be objectionable with c.w. during mobile operation.

When 12-volt primary power was used, it was found that performance did not equal that ob-

[*Continued on page 95*]



Bottom view of Lil Lulu. High-quality components are used throughout in an easy-to-reach arrangement. The r.f. stages are shielded from one another. The v.f.o. section, which has its bottom cover removed, is at the upper right. The low-pass output filter is in the lower right section.



The Knight-Kit LC-1 code oscillator and transmitting key which is supplied with it. A three-position switch provides selection of loud speaker (at the left), blinker light (at left above switch) or jack for headphones (at right above switch). A label with the code characters is pasted on the side of the case (foreground).

CQ Reviews:

The Knight-Kit Model LC-1 Code Oscillator

KNIGHT-KIT® has come up with a real nifty little code-practice oscillator in kit form, their Model LC-1. It is especially designed to aid aspiring amateurs, scouts, students, hobbyists and short-wave listeners in learning the International Morse Code.

Its advanced design features a two-transistor circuit with economical operation using a single "C" size flashlight battery, a tone control, a built-in loud speaker which provides sufficient volume for group practice, a phone jack for use with any high-impedance headphones and a code-flasher light. Selection of speaker, phones or light is made by a three-position swtch on the panel. In addition to this, a professional type adjustable key is included.

Assembly of the kit requires from two to three hours and may easily be accomplished by even the neophyte when the easy-to-follow instructions, as set forth in the assembly manual, are used together with Knight-Kit's usual means for readily identifying components.

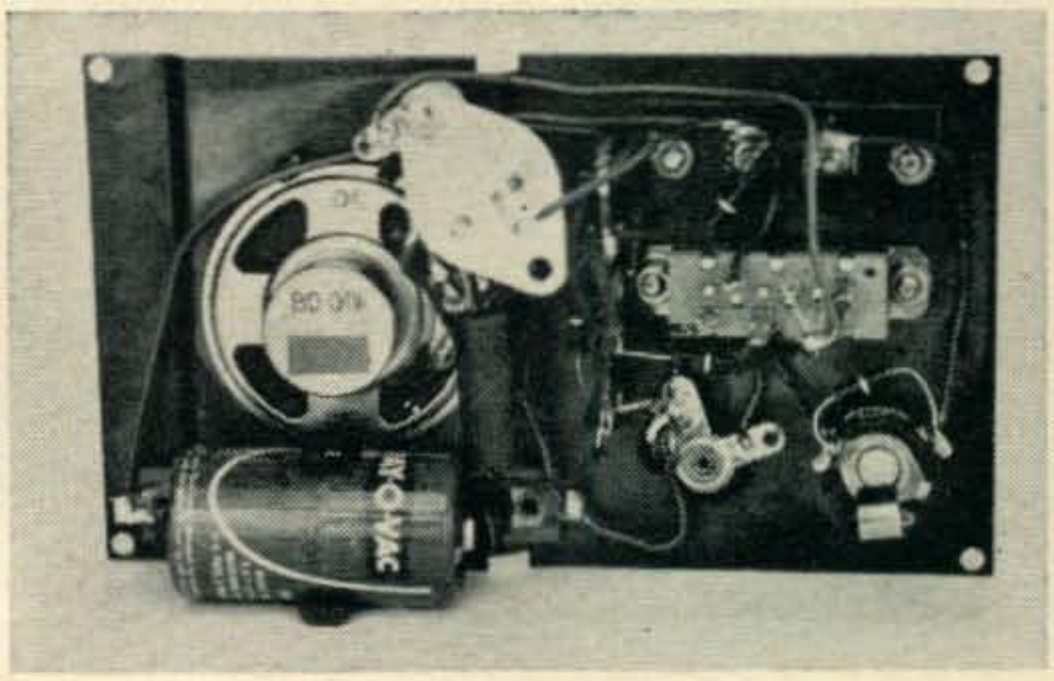
After the unit has been wired and the work carefully checked over, no difficulty should be encountered in getting it to work. The only adjustment required is that of a variable internal tone control which is set for the best stability at the most desired tone. A moderate range of tone selection may be obtained with adequate stability.

Performance

In operation the LC-1 functions nicely with clean keying characteristics, pleasant tonal quality and excellent volume resulting from the use of a power-type output transistor. The key is adjustable to fit the operator's touch. In this respect however, it was found that the minimum spring tension was too great for the light-fingered user. This was corrected by removing the spring and compressing it all the way before re-installing it. Better latitude of adjustment was then obtainable. It will also be well to screw the key to a base of larger area to stabilize its position during use.

The use is attractively styled with a two-tone panel of charcoal and light gray which is mounted on a black plastic case on one side of which is pasted a label with the Morse Code characters for ready reference. The size is 6¼" × 3¾" × 2" making it possible to carry the unit in a coat pocket. Weight is only 1 lb.

The Knight-Kit Model LC-1 Code Oscillator sells for $7.95 including battery, lamp and key! It is available from Allied Radio, 100 N. Western Ave., Chicago 80, Ill.—*W2AEF*



Interior view of the Knight-Kit LC-1 code oscillator. The power transistor is to the right above the speaker. To the right of the battery are the lamp socket and the phone jack.

IQSY—The International Quiet Sun Year

BY D. R. HEARSUM*, W8LUZ ex G2HLP

Scientists and the amateur fraternity plan to make the most of the period of minimum solar activity—the sun spot doldrums.

THOSE of you who followed or were active in the scientific work carried out during the IGY—International Geophysical Year—will be interested to learn that we are about to witness another "International Scientific Spectacular." Scientists of some 36 nations will take part in geophysical research during 1964-65, the "International Year of the Quiet Sun" or IQSY.

Our hobby, high frequency communication, has a spicy element of chance which is forced upon us by solar flares and the resulting sun spots. As you know, these solar activities occur in dual 11 year cycles, each originating in a different hemisphere of the sun. In 1964-65 it is predicted that we shall be experiencing a minimum of solar activity as shown in fig. 1. These

Fig. 1—A plot of Sunspot Cycle 19 based upon smoothed sunspot numbers from the Zurich Observatory.

predictions led the Geophysical Committee of the International Council of Scientific Unions to propose a program at its 1961 meeting in London, England. The proposal has resulted in the IQSY. In a letter to Dr. Alen T. Waterman, Director of the National Science Foundation, President Kennedy authorized United States participation in the IQSY. The National Academy of Science—National Research Council is developing the United States plans for the IQSY in cooperation with the National Science Foundation.[1]

Amateur radio has contributed handsomely to our ability to communicate internationally. We hams strive to understand and use some of the atmospheric conditions which permit us to communicate reliably, or fold up our tents and quietly steal away. Until recently, and certainly without our experimental efforts, it would have been practically impossible for man to consider undertaking such vast international scientific programs as the IGY and now the IQSY. Indeed, our own United States programs of upper atmosphere research, charting the oceans, or even studying the wild life in the Polar regions are only achieved safely and with the aid of fast, reliable communication. Let us have a look then, at some of the things which will take place during the year of the quiet sun. We will also try to see where amateur radio might again participate, if only to permit those far from home to talk to their friends and relatives stateside.

Quoting Dr. Waterman: "The program calls for observations in the disciplines of solar activity, geomagnetism, aurora and airglow, ionospheric physics, cosmic rays, space research, meteorology and aeronomy." Right away we can guess that there are areas where the ham may be "on call" for some of these phenomena. The v.h.f. gang, for example, may even have an Oscar in orbit just when and where needed during a sprightly session of air glow and aurora!

Plasma

Another specific study is—determining the state of the interplanetory medium during solar minimum—any volunteers to take a low powered rig on a space probe? Scientists refer to the interplanetory medium between the earth and the sun as plasma. Plasma exists in all regions where the gaseous or corpuscular matter is in an ionized state that is, there are free electrons in the medium. This is a condition which can be produced in the laboratory in a neon tube, for example. Plasmas in the solar system can be relatively static or can consist of matter that is rapidly changing its shape or drifting in a known direction. The "solar wind" is a case of drifting particles, drifting at great speeds. The Mariner space probe sensed a solar wind drifting at some 250 miles per second.

If we should take an imaginary voyage from the surface of the earth to the sun, we would find that the interplanetory plasma undergoes rapid changes near the surface of the earth and again as we approach the sun. These changes of temperature, ionization (electron density) etc., are shown in fig. 2. A great deal more is known

*8981 Clyo Road, Dayton 59, Ohio

[1]Each participating country in the IQSY has its own coordinating body. Reports and requests for additional information should go to: IQSY, National Academy of Sciences, 2101 Constitution Avenue N.W., Washington 25, D.C.

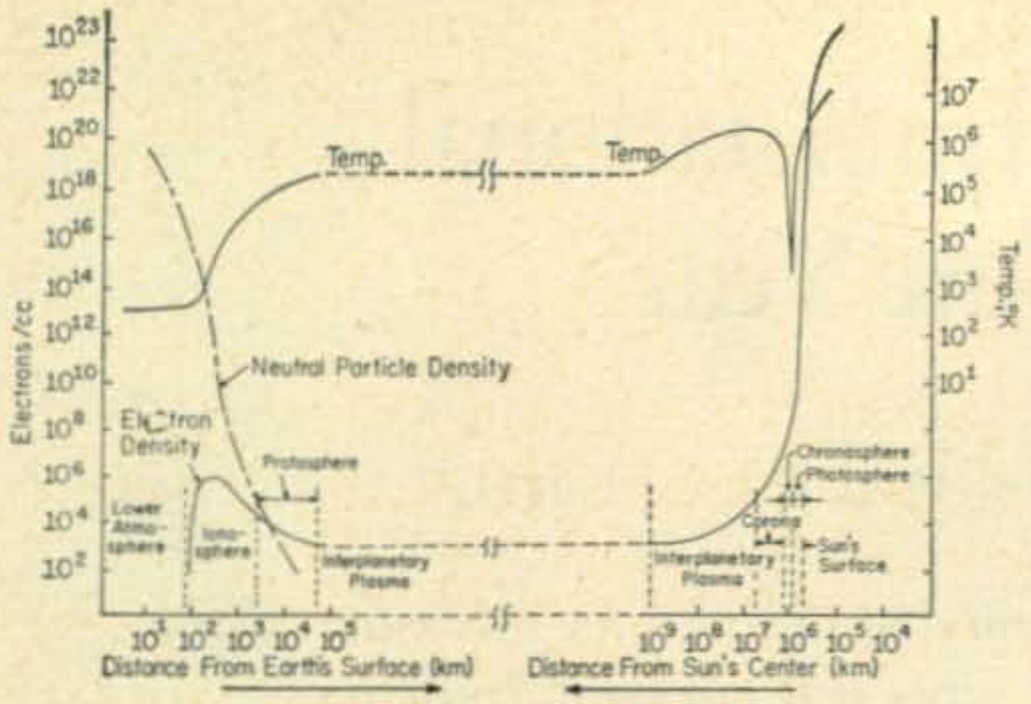


Fig. 2—Charts indicating the characteristics of the plasma between earth and sun. After Bochynski, IRE Proceedings, December 1961.

about the state of the region close to home, namely the lower and upper atmosphere, the ionosphere and the more remote protosphere, than the rest of space. At the other end of our imaginary trip, as the sun is approached, we reach the sun's corona, the chronosphere, the photosphere and finally the fiery surface. Actually, it is the activity here, in this remote area, which causes many of the effects observed in the plasma close to the earth. During the IQSY, records will be made of the spectrum of radio bursts from the sun and will be used to study the density of electrons in the sun's corona. Every effort will be made to determine the energy level of solar ionizing radiations that influence the content and consistency of the middle atmosphere and in turn our radio propagation conditions. In other words the interaction between electromagnetic waves and the plasma close to the earth drastically influences our communication circuits.

Radiation Belts

As you know, the Van Allen and other radiation belts have been discovered more recently. The Van Allen belts are particularly interesting because they consist of radiation from the sun which has become trapped due to the deflecting forces of the earth's magnetic field. They give rise to huge circulating currents in the upper atmosphere. These currents, in turn, could influence the earth's magnetic field. Very little is known about the interrelationship of these more recent discoveries and their influence on radio propagation.

And so you see such IQSY work as "mapping the earth's radiation zones for shape and density" may give some real clues to the conditions that either frustrate or please us when trying to raise that choice DX. Here, perhaps, we can only observe results, but who knows what propagation effects may coincide with the facts which the experts turn up. These experiments should spur us into better use of our log books—after all, we do a pretty poor job of recording the "conditions" which we observe and talk about so eloquently during our operating hours. Some logs could be very revealing, I'm sure, and could include notes about aurora, solar noise, or even a successful v.h.f. scatter QSO. So let's jot down those unusual conditions as we observe them, and then we can compare notes with the expert results as they are published.

Observation Facilities

In most cases the United States IQSY program will use the data received from existing facilities and geophysical networks used since IGY. These will be supplemented by the universities and other private institutions where the observations need to be stepped up. A small number of additional observation centers may also be set up for IQSY and we may well keep a sharp lookout for them on the air and perhaps offer amateur relay aid to these temporary outposts. In order to monitor the earth's radiation zones and their effects, observations will be made at magnetically conjugate points on the earth. For example, at posts near the poles, Alaska, Canada and the northern United States and corresponding locations in Australia, New Zealand and the Antarctic. At these and other observation posts workers will study whistlers at low and very low frequencies, and will provide an extensive radio noise network. Radio and radar will be used to measure temperatures throughout the radio spectrum.

Special research during the solar minimum will include observation of the sun from the ground, probably some balloon-borne solar telescopes, and, of course, rocket soundings. Spaced receiving antennas on the ground will attempt to detect solar flares not seen by optical means.

You must realize that these experiments are being carried out for the very first time in history when solar activities are truly becalmed in the doldrums. Let's not react with a literal interpretation of "IQSY" and all swarm into the lower frequency bands—let's stay put sometimes and see what Ole Sol can do during his quieter years! A lot of learned people are about to help us find out! ■

A Fully-Manual Time-Sequence Key

BY DAVID T. GEISER*, WA2ANU

This simple modification of a hand key permits independent keying of the oscillator and amplifier stages. It also provides a simple method for keying the oscillator only thus providing a means for zeroing.

THE c.w. practice of letting the oscillator of a transmitter run continuously while keying the amplifier gives a good radiated signal, but makes receiving on the same frequency difficult. Keying both the oscillator and the amplifier at the same time may cause oscillator instability with clicks, chirps, and thumps. Time sequence keying turns on the oscillator first; after time has passed for oscillator short-term stabilization, the amplifier is turned on. When the key is lifted, the amplifier turns off first, followed by oscillator turn-off. Oscillator frequency instability just isn't transmitted.

The owner of a J-38 (or other) hand key can have the advantages of time-sequence keying at a net cost of less than a dollar.

The one requirement of time-sequence keying is that the oscillator reach stable frequency quickly. Almost all kit and commercial v.f.o.'s will do this. There should be no lag filter in the oscillator keying lead, though an r.f. choke and 0.001 mfd TVI filter is permissible. This lets oscillator frequency transients end quickly. Click filters, if needed, should be placed in the amplifier keying lead.

The simplest way to perform sequenced keying is to fit an ordinary key with an extra set of contacts (see photo) adjusted to "make" before the original contacts touch each other; the new contacts also "break" *after* the original contacts open at the end of a dot or dash. Use the new contacts to key the oscillator and the original contacts to key the amplifier, and you have a time-sequence key.

Contact Source

The extra contacts may be made from old relay arms, though the contacts shown in the photograph were new and selected from the Guardian 200 kit of contact arms. One kit contains enough parts for at least two more keys (and possible four, using other mounting methods).

*Light Military Electronics Dept., General Electric Co., Utica, N.Y.

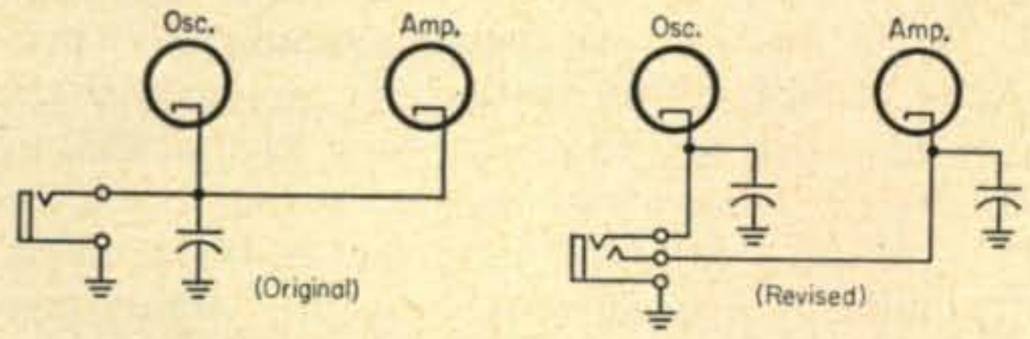


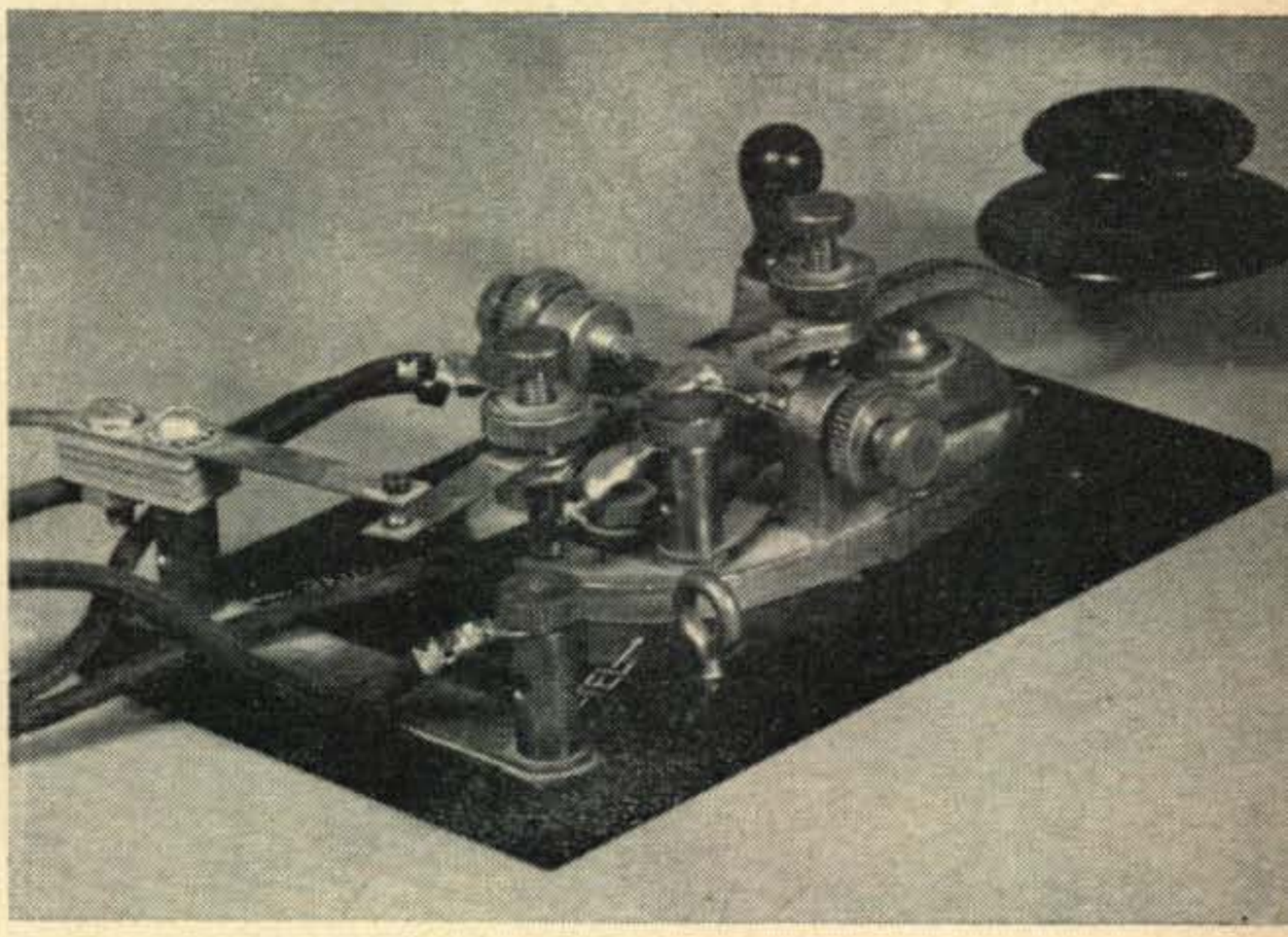
Fig. 1—The simple method of splitting the oscillator and amplifier keying circuits is shown above.

Only one precaution is necessary: Make sure parts are securely mounted to prevent mechanical shifting. The contact arm attached to the key lever is not only held in place by the "spacing adjustment" knurled bolt, but also is soldered to the key arm. The stationary contact arm is secured with bolts and lockwashers.

Zeroing Provisions

Transmitters having oscillator and amplifier cathodes keyed with a single key may be "split" (fig. 1) by replacement of the single-circuit keying jack with a two-circuit jack. If this is done, it is suggested that the oscillator circuit be the *first* one reached by an inserted plug, so that *partial* insertion will permit keying the oscillator alone without also keying the amplifier, for zeroing-in and other use.

It should be noted that time-sequence keying will not eliminate chirp resulting from crystal heating in an improperly adjusted crystal oscillator. Such slow chirps is a sign of crystal overload, and the crystal is in danger. When in doubt, query the equipment designer for a recommended make and type of crystal. ■



The accessory hardware on the J-48 key provides a convenient mounting for the extra contact arm. Note the solder at the crossbar of the arm to insure good connection for the movable contact.

NAME THAT THING!

BY RAYMOND DE VOS*, W2TAM

SHADES OF WALTER MITTY

AFTER a good supper, as was my custom, I went into the living room to watch a few of the early evening TV programs. Comfortably settled in an easy chair, I could digest my food in peace to the accompaniment of the shrill voices coming from the TV and the rattling of the dishes in the kitchen. Normally, I would only stay for about one half hour, but somehow, on this particular evening I felt fuller than usual and the chair seemed cozier so I decided to extend my viewing period a bit . . .

And now, Ladies and Gentlemen, we present to you "NAME THAT THING," the show you have been waiting for. A program designed to keep you on the edge of your seat, test your ingenuity, your skill, your knowledge and your perceptiveness. Prizes? Yes indeed! Prizes such as you and I dream about. Now, in order to make it even more interesting, we are not going to announce the prizes until a contestant has won. And now a word about how this program functions. This week we have chosen from among a multitude of applicants three distinguished connoisseurs whom we consider the best informed in the field as our contestants.

". . . Three distinguished connoisseurs . . ."

These gentlemen will be confronted with a piece of surplus equipment to be identified as fully as possible. If any contestant fails to recognize the equipment he will be eliminated, the successful contestants will go on to the next higher level, which means a better prize, but also a more difficult identification. In as much as we do not wish any unlucky contestant to leave empty handed we have consolation gifts. This is not a prize but a gift, which consists of a shopping bag containing fifty pounds of self tapping steel screws with octagonal heads, as salvaged from the World War II German aircraft industry. A mighty fine prize, and one I'm sure all recipients will treasure and which will come in handy around the shack for various construction purposes. So, on with the program!!!!

The contestants are seated at small tables, each with his own microphone and a pad and pencil. A large polished table placed center stage serves as display counter for the equipment to be identified. Numerous spotlights are located strategically to give the best possible lighting. A hush descends upon the audience as a page boy in full dress uniform brings out the first piece of equipment and sets it carefully on the mahogany surface. He centers it carefully, removing in the process a normal amount of varnish, and his look of anguish is replaced by one of joy as he marches off stage. The announcer looks appreciatively at the equipment, black crackle finish with nice shiny screw heads, smiles at the audience and then turns to the contestants. "You will write your answers on the pad provided. When you have signalled that you are finished the page boy will bring the pad to me and I will read your answers aloud and then give the correct answer. If you fail to give the correct answer you may leave the stage and collect your consolation gift in the wings. Kindly identify the piece of equipment now on the display table and good luck." A few moments of intensive scribbling follow and finally the pads are in the hands of the announcer. He reads very solemnly, "Contestant number one, APR-1, hi frequency receiver. Contestant number two, APR-1 receiver. Contestant number three, ARC-27 transmitter." Ladies and gentlemen, the correct answer is AN/APR-1. Loud applause. Contestant number three gets up from the table very dejectedly and goes off stage to collect his gift. The announcer again, "The prizes you have won are, first a bag of 1000 unmarked resistors; 100 two-inch drills, used and may need sharpening and 100 lock washers." Everyone settles down after the first round of excitement and the next piece of equipment is brought in. Same routine is followed. "Contestant number one, MAR receiver, Navy type, high frequency with power supply. Contestant number two, RDZ receiver portion only, no power supply except dynamotor, 220 to 390 mc, crystal controlled, can be used with MAR but is not an integral part of the instal-

*140 Summit Ave., W. Trenton, N. J.

lation. The correct answer is as stated by contestant number two, 100% correct." The announcer beams, the audience applauds wildly. It seems that the prize is a whole carton of 67½ volt dated surplus batteries, and something else. "Now, sir," turning to me, "you have won the following additional prizes a gift certificate for $100 to be used at the Croyden ship breakers yard as part payment on some electronic gear the full price of which will be set by Croyden. Note carefully that any

"... the full price of which will be set by Croyden ..."

tendency to haggling may render this certificate null and void. Since you are the only remaining contestant you will give your identification directly into the microphone." Same routine as before only now I'm alone and I see the page boy arriving with something that looks like an AN/APA-6. He is wasting his time, baby stuff!! "And now ladies and gentlemen," I hear the announcer saying, "we come to the last and final award. Sir, if you win this time you will be without a doubt known as the most knowledgeable, best informed surplus hound in the United States. I might as well tell you that the prize will be a guided tour through every surplus store and yard in the fifty states and ten tons of electronic equipment and parts of your own choosing, freight prepaid. So now sir if you are ready we will begin with part one of this three part question." The page boy put a small olive drab rectangular box on the table. It had rubber feet, but when set on the rubber feet the handle was on the side instead of on top. Where had I seen this before? Let me think. . . . I took a stab. "This is a TS 47/APR, signal generator, 40 to 500 mc." I hear the announcer shouting the word, "Correct," and then I keep my fingers crossed for the next part. You know, it is getting tougher all the time. I look toward the table and see that the thing to be identified is not a complete unit, but a part of a unit. Well, let us see, it looks like something out of the ART-13, either the crystal calibrator or the speech amplifier. This is not too difficult, but I must not make a snap decision. Another look, oh yes, no crystal, well, here I go. "This is the speech amplifier from the ART-13 transmitter with driver transformer, a plug-in unit with Dynamic or Crystal input." The M.C. corroborated this statement and loud applause and some cheers rang through the studio. "And now, sir," the announcer purred in his most unctious manner, comes part three. If you answer this one correctly the grand prize is yours. Good luck, and we are all with you in this final moment of supreme effort." You could feel the tenseness in the atmosphere; all was still as the page boy deposited the final "test" on the table. I looked and then my stomach hit bottom. What is it? A little black crackle container, round with three connectors, Amphenol size 18, I recognized, and two ears for clamping at the other end. It looks like something clamped onto something else with two large hand-tightened, probably knurled, nuts and three cables connecting to the other end. In my head the wheels were spinning furiously. I concentrated with all my powers and beads of perspiration came to my forehead. What is it? Faintly in the background I could hear the announcer urging me to say something since time was running out. All of a sudden, recalling some experience out of the past, it came to me. Of course, now I know, I almost shouted it, "This is a goniometer from the model DAQ direction finder made for the Navy. It attaches to the bottom of the scope indicator." The announcer could hardly contain himself. "Correct," he yelled, "absolutely correct." Pandemonium broke loose, the audience went wild and the applause defied the soundproofing in the studio. People rushed on stage to grab my hand, pat me on the back, or shake my shoulder. I was being congratulated, jostled, lionized, all at the same time; somewhere a bell rang. . . . . .

"The announcer could hardly contain himself."

"Wake up, wake up." My wife had me by the shoulder and was shaking me vigorously. "Wake up, turn down that darn TV and answer the phone. Some guy wants to talk to you about radio. My heavens, with that TV so darn loud and the phone ringing, how can you possibly sleep with all that racket? You might also wipe that silly grin off your face. What's so funny anyhow? You might think you just won a prize or something! ■

Diode Power Supply Calculations

BY E. H. MARRINER*, W6BLZ

This article explains how to determine the number of diodes needed for full wave and bridge circuit power supplies and discusses the selection of power transformers for use in bridge circuits.

MANY hams have damaged silicon diode rectifiers because they have exceeded their peak-inverse-voltage ratings. When replacing the rectifier tubes in a full-wave transformer type power supply with one diode in each side of the secondary, the p.i.v. rating *must* be taken into consideration to prevent damage. This article is designed to give a clearer understanding of how to arrive at the number of diodes necessary when building or modernizing an a.c. power supply.

Most of our discussion will be confined to 400 p.i.v. type diodes. Because of their price and availability, 400 p.i.v. diodes are most commonly used by amateurs. Let's see what can be done with these diodes in a full-wave type power supply.

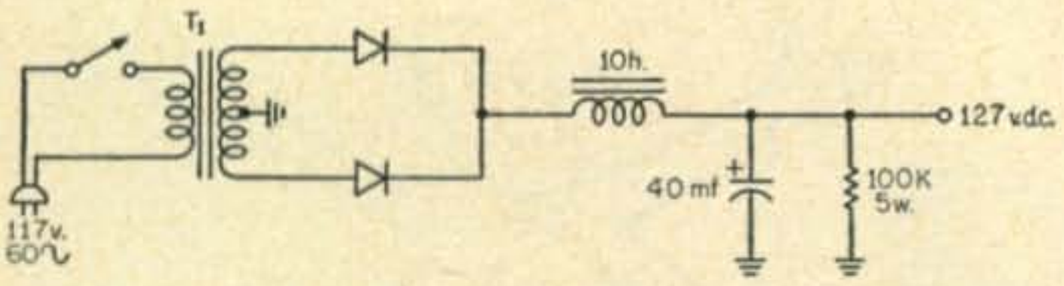


Fig. 1—The use of diodes in a full-wave configuration is shown above. With 400 p.i.v. diodes units the d.c. output is limited to 127 volts as explained in the text.

The use of one diode in each side of a transformer is very discouraging. The circuit of fig. 1, a simple full-wave rectifier, presents a peak inverse voltage to the diodes equal to the peak voltage of the full secondary. A little calculation will show that, with 400 p.i.v. diodes, the maximum allowed voltage across the full secondary is 280 volts r.m.s. This will provide a d.c. output of 124 volts, *if* you could find a power transformer with this low rating.

It is possible to increase the p.i.v. rating by connecting diodes in series. Thus the use of two in each leg would raise the total p.i.v. rating to 800 volts. However, these same four diodes can be used more efficiently in a bridge circuit. The transformer size will be smaller since the full secondary voltage needed is only half the voltage required for full-wave operation.

Bridge Rectifier Circuit

Figure 2 is a typical bridge circuit that provides an output of 560 and 240 volts. A positive

*528 Colima Street, La Jolla, California

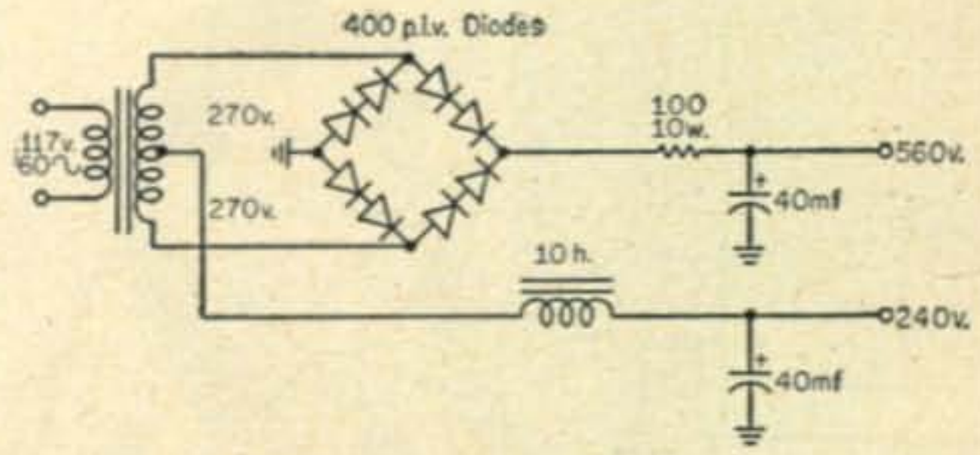


Fig. 2—A practical bridge circuit using 400 p.i.v. diodes. With a 100 ohm filter in the high voltage output, the peak voltage is approached rather than 482 v.d.c. that would be obtained with choke input.

output of almost one half the full output, 240 volts, is taken from the center tap of the power transformer secondary and used as a screen voltage supply. The eight diodes used each have a 400 p.i.v. rating. The current ratings of the diodes usually exceed that of the power transformer so the transformer current rating is the limiting factor. Actually the diodes can stand a short circuit current up to 5 amperes for a brief period of time but they cannot stand an excessive peak inverse voltage at all.

Power Transformer

When we use a power transformer designed for full-wave operation in a bridge rectifier circuit, theoretically, the available current is reduced to about one half that of the full-wave rectifier. This is because any increased power drain in the secondary circuit is reflected back to the primary where there will be a corresponding increase in current. This may overheat or burn out the primary winding. To illustrate this more fully, consider a transformer with a high voltage winding of 600 volts r.m.s. center tapped at a 100 ma rating. In a full-wave circuit this transformer will produce a d.c. output of 270 volts. If the full 100 ma is drawn we dissipate 27 watts. ($W = E \times I = 270 \times 0.1 = 27$ watts.) Place the same transformer in a bridge circuit and we will get an output of 540 volts. If we still draw 100 ma, the power dissipated will be 540×0.1 or 54 watts. This will double the primary current.

For practical applications the bridge rectifier will operate at almost the full transformer current rating for several reasons. First, replacement transformers are designed for continuous operation. C.w. or s.s.b. operation provides a

shorter duty cycle thus reducing the average power. Also, by using a choke input filter, the output voltage will be reduced, thus increasing the amount of available current. Since the 5 volt filament winding is not used, this power saving is also transferred to the high voltage winding.

Generally speaking, as long as the transformer doesn't heat up enough to destroy the insulation there is no reason not to use it. If the load is not held constant for periods of more than a few minutes at a time, the heat losses will be negligible. For s.s.b. and c.w. these requirements are fulfilled and thus a 1300 volt r.m.s. center tapped transformer at 250 ma, in a bridge circuit, will supply us 1200 volts at 250 ma. It isn't hard to see that a bridge rectifier, using diodes, will save weight, space and money.

How Many Diodes?

At this point we will explain how to determine the number of series diodes needed in each leg to accommodate a higher p.i.v. Let's assume a required d.c. output of 600 volts. To determine the required peak a.c. to be delivered by the transformer we multiply $E_{d.c.}$ by 1.57; $1.57 \times 600 = 942$ volts. The p.i.v. of each leg then must be able to withstand about 950 volts. Three 400 p.i.v. units may be placed in series or two 600 p.i.v. units to provide 1200 volts for a good safety factor. If the r.m.s. voltage of the transformer is known, the chart of fig. 3 may be used.

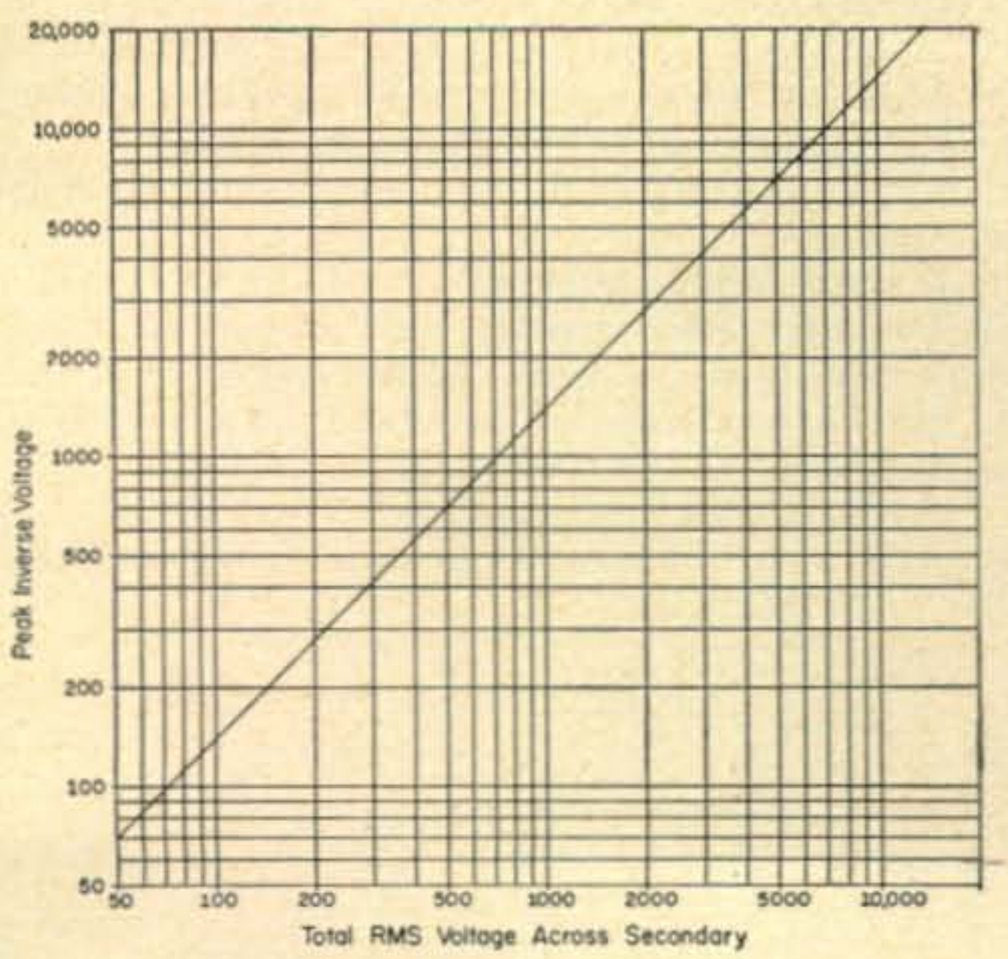


Fig. 3—A handy chart to convert r.m.s. to peak or *vice versa*.

Transformer Rating

In order to acquire a power transformer we must know the r.m.s. rating of the high voltage secondary. This may be found in one of two ways. First we may multiply the required peak voltage by 0.707. This is; $942 \times 0.707 = 666$ volts. Thus a power transformer that provides about 650 or 660 volts r.m.s. is necessary.

This figure can also be determined by multiplying $E_{d.c.}$ by 1.11. This is $600 \times 1.11 = 666$ volts. Either approach is valid.

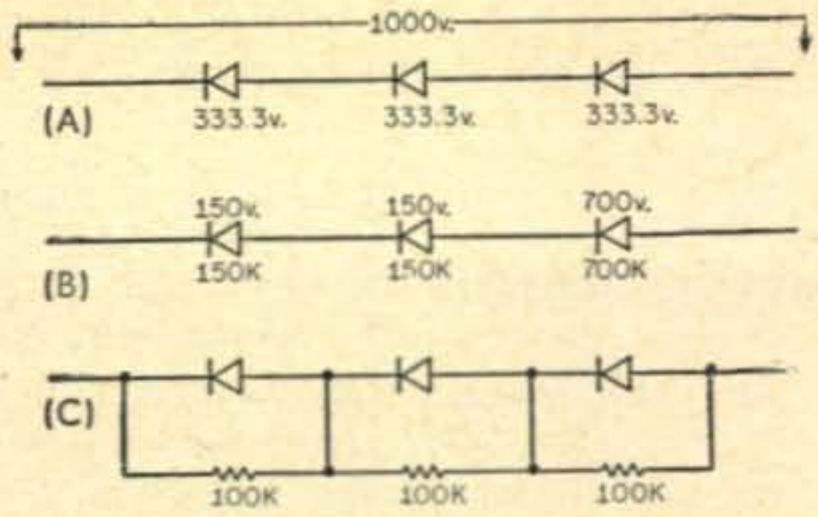


Fig. 4—When diodes are placed in series the voltage drops that appear across them when they are non-conducting may be equal as in (A) but may not be equal as in (B) due to different back resistances. In such a case the drops may be equalized by resistors as in (C).

Series Diodes

When diodes are placed in series for rectifier operation a precaution must be observed. When similar type diodes are in the non-conducting state there is no assurance that their back resistances are identical. Consider the three diodes shown in fig. 4. Here we have three 400 p.i.v. rated units across 1000 volts. If the back resistances are all equal the drops are as shown in (A), 333.3 volts each, well in the safety zone. However, this is rarely the case as the back resistances may vary widely. Figure 4 (B) shows a more likely situation. Here, the back resistances are varied and thus the voltage drops across each diode vary as shown. Note carefully that one diode has a voltage drop across it in excess of its 400 p.i.v. rating and will quickly break down. This will place an increased load on the remaining two diodes and they will soon follow the first.

The solution is the use of equalizing resistors as shown in fig. 4 (C). This assures an equal distribution of voltage across the diodes despite differences in back resistance.

Why not try to build a diode power supply? Check the surplus ads for some inexpensive 400 volt diodes and give the bridge circuit a try; I am sure you'll be happy with the results. ■

"QRX, fellas—QRX!"

Rules: 1963 *CQ* World Wide DX Contest

Oct. 26-27, Nov. 23-24, 1963

I. CONTEST PERIOD

PHONE SECTION: 0000 GMT, Saturday, October 26th to 240 GMT, Sunday, October 27, 1963.
C. W. SECTION: 0000 GMT, Saturday, November 23rd to 2400 GMT, Sunday, November 24, 1963.

II. BANDS

Contest activity will be in the 1.8, 3.5, 7.0, 14.0, 21.0, and 28.0 mc amateur bands.

III. TYPE of COMPETITION

1. PHONE SECTION:
   (a) Single Operator.
   (b) Multi-Operator, single transmitter.
   (c) Multi-Operator, multi-transmitter.
2. C.W. SECTION:
   (a) Single Operator.
   (b) Multi-Operator, single transmitter.
   (c) Multi-Operator, multi-transmitter.
3. INTER-CLUB DX Clubs affiliated to a National body.

IV. EQUIPMENT

There is no limit to the number of transmitters and receivers allowed, and competitors may use the maximum power permitted under the terms of their license.

V. SERIAL NUMBERS

1. Phone stations will exchange serial numbers consisting of 4 numerals, the first two being the RS report and the last two their own Zone number.
2. C.w. stations will exchange serial numbers consisting of 5 numerals, the first three being the RST report and the last two their own Zone number.
3. Stations in Zones 1 through 9 will prefix their Zone number with Zero. (01, etc.)

VI. POINTS

1. Contacts between stations on *different* continents will count three (3) points.
2. Contacts between stations on the *same* continent but *not* in the same country, will count one (1) point.
3. *Exception:* Contacts between stations in the North American continent will count two (2) points.
4. Contacts between stations in the *same* country will be permitted for the purpose of obtaining a Zone and/or Country multiplier but *no* QSO points will be credited.
5. Only one contact per band with the same station, will be permitted.

VII. MULTIPLIER

Two types of multipliers will be used.
1. Multiplier of one (1) for each Zone contacted on each band.
2. Multiplier of one (1) for each Country worked on each band.

VIII. SCORING

1. The score of *each* single band will be the *sum* of the Zone and Country multiplier for that band, *multiplied* by the total contact points on that band.
2. The total all band score will be the *sum* of Zone and Country multipliers of all bands, *multiplied* by the sum of the contact points on all bands.
3. Those sending in logs for a single band will be eligible for a single band award only. If a log is sent in for more than one band, indicate which band is to be judged, *otherwise it will be judged as an all band entry.*
4. A station will not be eligible for more than one award.
5. Single operator contestants must show a *minimum* of 12 hours of operating time to be eligible for an award. If a contestant operates on more than one band and wishes to be judged for a specific single band, he must show a *minimum* of 12 hours on that band.
6. *Exception:* Contestants using the 21 *or* 28 mc bands will be required to show a *minimum* of only 8 hours.
7. Multi-operator stations must show a minimum of 24 hours of operating time to be eligible for an award.
8. Multi-operator stations will *only* be judged on the basis of an all band score.

IX. ZONES and COUNTRIES

The *CQ* Zone map and the ARRL and WAE country lists will be used as standards. The continental boundaries used for WAC will also be recognized. Should any question arise as to the positive location of a station the official definition will be final.

X. AWARDS

Certificates will be awarded for each section of the Contest as follows:
1. To the highest scoring single operator station on each single band in the following areas:
   (a) Each call area of the United States, Canada and Australia.
   (b) All other countries.
2. To the station having the highest all band score (more than one band) in the following areas:
   (a) Each call area of the United States; Canada and Australia.
   (b) All other countries.
3. Awards to multi-operator stations will only be made as in §2 above.

CQ WORLD-WIDE DX CONTEST CQ Page ___ of ___ Pages

Call _____

Single Band ☐ All Band ☐ | Single Operator ☐ Multi-Operator ☐ | Phone ☐ CW ☐ | Single Transmitter ☐ Multi-Transmitter ☐

Band	QSOs	Zone Multiplier		Country Multiplier		Points		Band Score	Band
1.8 Mc			+		×		=		1.8 Mc
3.5 Mc			+		×		=		3.5 Mc
7 Mc			+		×		=		7 Mc
14 Mc			+		×		=		14 Mc
21 Mc			+		×		=		21 Mc
28 Mc			+		×		=		28 Mc
TOTAL			+		×		=		All Bands

INSTRUCTIONS: To determine All Band score, total each column with double line. Single band stations are permitted to operate on more than one band. However, indicate and total ONLY the band you wish judged.

_____ (Signature)

Name _____ Call _____
(USE BLOCK LETTERS)

Street and Number _____

City _____ Country _____

Logs must be postmarked not later than December 1, for Radiotelephone section and January 19, for Radiotelegraph section.

Submit logs to: CQ Contest Committee, 300 West 43rd St., New York 36, N. Y.

CQ Form 1057 eff. May, 1962.

The Summary Sheet shown here, as well as regular log sheets, may be obtained free of charge upon receipt of an s.a.s.e., or in the case of a DX station, 1 IRC.

CQ WORLD-WIDE DX CONTEST CQ — Page 2 of 4 Pages

CALL W1GYE Log For 14 Mc Band COUNTRY U S A

(Use separate log for each band.) PHONE ☐ CW ☒

DATE / Time GMT	STATION	SERIAL NUMBER Sent	SERIAL NUMBER Received	Fill in only when QSO is mult. Zone No	Fill in only when QSO is mult. COUNTRY	Points
Nov. 23, 1963						
0003	CX2CO	59905	59913	13	Uruguay	3
07	CX1BY	58905	59913			3
13	LU5AQ	57905	58913		Argentina	3
17	HK1QQ	57905	57909	9	Colombia	3
21	YV5AGD	56905	57909		Venezuela	3
25	KP4CC	56905	56908	8	Puerto Rico	2
29	KP4CK	56905	56908			2
31	VP7NY	55905	56008		Bahamas	2
33	W6RW	55905	55903	3	U S A	0
35	W8JIN	55905	55904	4		0
1320	TF3AB	56905	56940	40	Iceland	3
25	OX3KC	55905	56940		Greenland	2
30	VO2NA	56905	57902	2	Canada	2
40	VE2NV	55905	55905	5		2
Nov. 24						
1200	JA1VX	57905	57925	25	Japan	3
10	HL9KH	58905	57925		Korea	3
15	KL7JDO	56905	56901	1	Alaska	2
25	KH6IJ	56905	57931	31	Hawaii	3
35	VK2GW	55905	56930	30	Australia	3
45	VK6RU	55905	55929	29		3

DX DX DX DX DX

URBAN LE JEUNE, JR.*, W2DEC

The following certificates were issued between the period from June 6th, 1963 to and including July 9, 1963:

CW-PHONE WAZ

1815	VK5BS	Kenneth Douglas Halsall
1816	OH3PF	Seppo Syvaniemi
1817	K9ALP	Louis G. Arnold
1818	DL1SF	Arthur Lottermoser
1819	W8QQH	Kenneth J. Patterson
1820	W3DXN	Leonard G. Glass
1821	W7DIS	Allen N. Davis
1822	KØKKU	Edward L. Wood
1823	DL9OH	Karl Müller

TWO-WAY SSB WAZ

168	W6ZJY	Larry Ewig

CW WPX

452	K4TKM	Brook Byers
453	W3GOQ	Robert W. McMurray
454	W3AHX	John R. McMurray
455	W5EJV	L. F. Wanja
456	W4BZ	B. W. Benning

PHONE WPX

94	DL2UZ	Emmanuel Tassin

MIXED WPX

70	W4BHG	James H. Millard
71	VE3PV	Peter Victor Travis

BV1 Formosa: The following letter is from Don, K8TZU, ex-BV1USF. "This is to let you, as well as your readers know that BV1USF went QRT on 8 June 1963 for lack of an operator. I had to close down the station in preparing to leave for the U. S. on 26 July 1963.

"BV1USF first went on the air on 22 Dec. 61. During this period, I have had 1,439 contacts on a.m., c.w. and s.s.b. All operation has been on 20 and 15, but predominantly 20 because of band conditions and frequency restrictions.

"I'm way behind on QSL cards (roughly 1,000) just got a thousand cards from the printers and am endeavoring to get them out of the way, so patience all. Pileups were terrific stateside the last three months of operation.

I will be operating K8TZU/9 Madison, Wisconsin probably in September or October 1963. New address for queries into BV1USF contacts will be: SMSG Donald K. Walker, Hq 30th Air Division (ADC), Truax Field, Wisconsin."

*Box 35, Hazlet, New Jersey.

Gopal, VU2GO (Sgt. N. Raja-Gopal) '63 Activities Manager of the Bangalore Club. Active mostly on c.w. with his B2. *(Tnx VU2GV)*

DUØ Philippine Islands: The following letter from Scotty, W3EFZ, explains the recent operations of DUØDM. The last paragraph should be especially interesting.

"On the weekend of 16 February, DU1's GF, RS, NL, OR and CE along with Ws 3EFZ, 4YKO, 5PCL, 6JVG, K4HHW and ex-KA1GZ journeyed to the famous island fortress of Corregidor and set up two ham stations, one in the lighthouse behind General MacArthur's old headquarters and the second in the guest house near Malinta Tunnel. The first expedition commemorated the initial landing of U. S. Forces on 16 Feb 1945 in the recapture of the stronghold from the Japanese.

"The special call sign DUØDM was issued by the Philippine Government for use on Corregidor on a joint Phil-U. S. operator basis. The suffix "DM" represented President *D*iosdado *M*acapagal and *D*ouglas *M*acArthur.

"Although conditions in February were not at their best, we did QSO some 250 stations on all continents.

WAZ and WPX

THE WAZ and WPX certificates are awarded by the *CQ* DX department. WAZ is issued for proof of contact with the 40 Zones of the world as shown on the official WAZ Zone Map. WAZ is issued in three classes, *i.e.* Any mode, all phone and all s.s.b. For complete rules, see the January, 1962 *CQ*, page 50.

WPX is issued in four classes, *i.e.*, all c.w., all phone, all s.s.b. and Mixed. The number of prefixes required are: C.w.-300; Phone-300; s.s.b.-200; Mixed-400. For complete rules, see January, 1962 *CQ*, page 52. WAZ applications, Zone Maps and WPX applications may be obtained from the DX Editor at the address shown at the head of this column. Please send a self-addressed, stamped envelope or a self-addressed envelope and an IRC. All applications should be sent directly to the DX Editor.

WPX HONOR ROLL

C.W. WPX

W2HMJ	685	YU1AG	503	DL9KP	450	W4DKP	410	CT1PK	600	W5ERY	358	K4PUS	305	W8JIN	605
W8KPL	632	W5LGG	502	W8JIN	449	W1CKU	408	W8WT	576	W8JIN	356	DJ3CP	304	W3OCU	588
W5KC	629	W6YY	502	W9UZS	447	K4IEX	408	G3DO	576	PY2CK	354	K1IXG	303	K9EAB	578
W2AIW	617	DL7CS	502	W8RQ	445	K4JVE	407	W9YSQ	471	5A5TO	353	WA2SFP	300	W6YY	570
W2EQS	605	K2CPR	501	W3AYD	443	W5AFX	407	CT1HF	466	W1ORV	351	K2TDI	300	W4BYU	557
W6KG	574	W9SFR	501	OE1FF	442	W7HDL	405	W9UZC	462	LA5HE	351	W3VSU	300	W3AYD	552
W4OPM	571	W2EMW	500	W3BQA	437	W4YWX	404	MP4BBW	454	W6USG	350	W4NJF	300	YU1AG	552
W9UXO	566	W2FXA	500	LA5HE	437	GI3OQR	404	PAØHBO	453	ZS6IW	350	W4RLS	300	HB9EU	551
K6CQM	565	K2ZKU	500	ON4FU	433	KP4AOO	404	W6YY	448			KØRDP	300	W2GT	528
W5OLG	564	K9EAB	497	VE3ES	433	ZS4MG	404	G8KS	430			WØCVU	291	G8KS	520
DL1QT	552	W2MUM	495	W8UMR	429	K2ZRO	403	VK6RU	421	**S.S.B. WPX**		GI6TK	278	K9AGB	510
W2NUT	550	W1WLW	494	WØAUB	429	W9DYG	403	W3AYD	420	MP4BBW	462	WA2EOQ	275	W5LGG	509
W1IJB	546	OK3DG	488	W2RA	428	W9IHN	403	F8PI	418	W4OPM	451	VE3ES	274	K2ZKU	508
K2UKQ	546	SM5CCE	488	K5LIA	428	VE6VK	403	PZ1AX	413	G3AWZ	428	K2JFV	266	W9DWQ	508
W9YSX	544	W4BYU	487	OK1MB	428	K4TEA	402	K9EAB	412	HB9TL	423	K2MGE	263	W4BQY	505
W9GFF	538	W8PQQ	481	W3CGS	426	G8PL	402	K2CJN	409	W3NKM	402	W3AYD	262	W3KDP	501
SM7MS	534	W4HYW	478	W1EIO	425	WA2CBB	401	DL3TJ	404	G3DO	402	W4EEU	262	W8UMR	500
ON4QX	533	W3OCU	466	KL7MF	424	K9BVR	401	W1UOP	402	K9EAB	401	VE3BKL	259	LA5HE	500
W1EQ	528	K6SXA	464	SM5WI	424	WØVBQ	401	G3NUG	400	G8KS	400	XE1CV	256	DL3RK	493
W2HO	526	W2KIR	463	WØPGI	420	IT1TAI	401	VE3BQP	386	W3MAC	381	G3FKM	255	JA2JW	480
K9AGB	515	DJ2KS	462	HB9TT	419	VE3JZ	401	OE1FF	382	G3NUG	356	UR2AR	255	WØMCX	476
KP4CC	515	PY4OD	462	G3HIW	418	OE3WB	400	SP7HX	381	TI2HP	356	K5OGP	254	W3CGS	475
IT1AGA	515	JA2JW	461	W8IBX	416	SP4JF	400	TG9AD	381	PZ1AX	345	W6USG	252	W9FVU	474
G2GM	513	W9WCE	458	WØMCX	416	SP6FZ	400	DL6VM	376	VE3BQP	334	TG9AD	252	G3FKM	463
W6WO	511	W3BCY	457	K2PFC	415	VE1AE	400	DJ3CP	375	W2HXG	324			DL1YA	456
W2GT	510	OK3EA	456	VK3XB	415	VE4OX	400	PAØSNG	369	W2VCZ	320	**Mixed WPX**		WØVBQ	452
W8LY	506	UC2AR	456	W5AWT	412	VK3KB	400	G3FKM	366	W6YMV	320			PAØLOU	452
W9DWQ	506	DL3RK	454	W5DA	412			W8UMR	363	W1UOP	318	W4OPM	629	GI6TK	450
G3EYN	503	PAØLOU	451	K5LZO	411	**Phone WPX**		SM3AZI	362	W2YBO	318	W9YSX	622	HK3LX	450
		W3PGB	450	WA2DIG	411			SM3EP	361	W8PQQ	315	G3DO	617		
		DL1YA	450	W2PTD	411	W9WHM	600	W1DGJ	358	W1ORV	307	W8WT	607		

"A repeat expedition to Corregidor occurred on the weekend of 18 May (Armed Forces Day in the Philippines as well as in the U. S.). On this occasion we operated three stations, a KWM-2 in the lighthouse on sideband and another KWM-2 on s.s.b. at Kindley Field plus a c.w. station in the guest house. In addition to the operators who participated in the first field day, we had DU1VQ, DU1IK, K1UDF, W5DAF, WA6RDH and KH6AED with us in May.

"True to the spirit of the historic joint stand by the WWII Phil-American defenders of Corregidor, we journeyed out to the island by Philippine Navy transportation and returned thanks to the U. S. Navy at Sangley Point. Past and present members of all three services, Army, Navy and Air Force were represented in the group—both Philippine and American.

"In May, propagation to the States was much better than in February and we QSOd some 300 Ws on s.s.b. and c.w.

"A letter has been sent to General MacArthur describing PARA's Corregidor ham activity and we suspect he will appreciate the call, DUØDM.

"You may be interested in knowing that additional 'expeditions' are planned. We plan to journey to Leyte (DU5) in October to commemorate the initial MacArthur landings there in 1944. The PARA is also entertaining the notion of operating a station on one of the remote islands (which may qualify as a new ham country) of this 7,000-island Republic; the Turtle Islands off Borneo are one possibility and the Spratlys another.

73, Scotty"

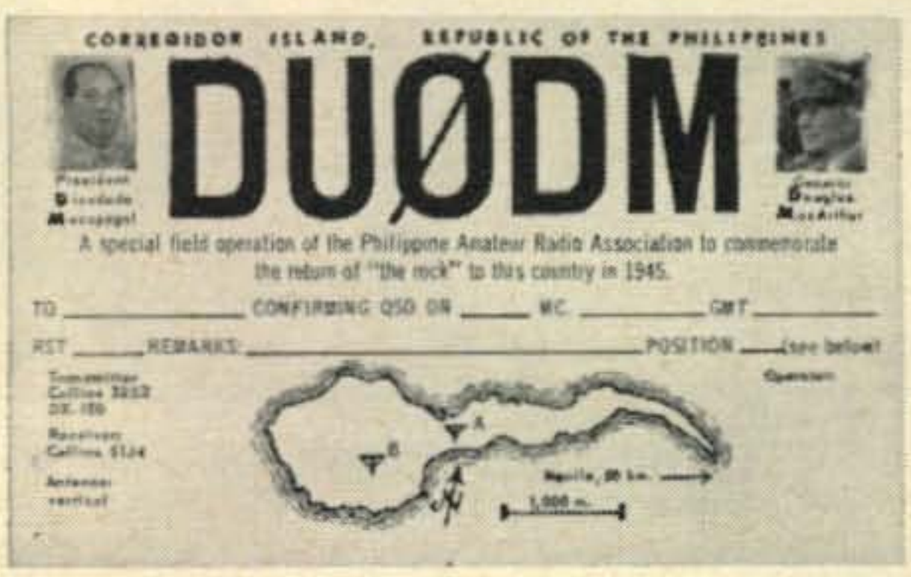
EAØ Spanish Guinea: EAØAB has been active recently around 14100 kc around 2100 GMT with his well-known T6 note. *(Tnx LIDXC)*

HS Siam: Many people have asked, "whatever happened to HS2M." Mike is now living at 2806 Blaine Drive, Chevy Chase 15, Md. and the following letter from him should be of great interest.

"I'm writing to you to let the rest of the amateur group know what has happened to HS2M. I'm now here in Maryland starting college at the University of Maryland. I have been back in the U. S. almost 8 months and I am just getting out all the QSLs I owe to everyone. I shall fill you in on my activities as HS2M.

"I began operating in February, 1961 as HS2MP. Soon after that I changed to HS2M. I found that the extra letter took up valuable time. I QRTed in April of 1962. In this time I worked about 18,000 QSOs and 181 countries. The rig was an Eico 720K and the modulator a pair of 807s and, I might add, that I was modulating 300%! Most of the QSOs were solid and many of them gave me fine reports. Some of them did say that I was the best signal that was ever heard by that station. The antennas were two half-wave dipoles out of phase and a homebrew G4ZU four element beam up forty feet on a mast. (no Rotor) The receiver was an RAL-8, a superregenerative job. It was about 20 years old at the time. I can't work what I can't hear. Hi! I was on about four hours a day average. That is why so many QSOs were logged.

"I have made many friends and a few enemies, I'm sure. But all in all, it was a very enjoyable time. Tried to work all the stations that were new to me, which explains why I delayed in answering stations who I had worked before. I wanted to give all those not worked a chance. If anyone would like their due QSL, please send yours to the above address. I have just mailed about 12,000 QSLs from this address, so if you don't get one within the next two months, try again. I probably missed some stations.



QSL used for the DUØDM operation. See text for story. *(Tnx W3FFZ)*

L to r: Kneeling (holding banner) W3EFZ, W5PCL, standing DU1GF, DU1RS, DU1NL, W4YKO, W6JVG, DU1OR, DU1CE, K4HHW. See text. *(Tnx W3EFZ).*

Group of Bangalore hams, l to r: Ghose, VU2SO; s.w.l. Prakash; Sampath, VU2KEZ; Mani, VU2SE; Gopi, VU2BG; Sulu, VU2GV and Sham, VU2BZ. *(Tnx VU2GV).*

"I have sold almost all of my gear as I am in need of tuition money for college and I don't think I shall have too much time to operate anymore for the next few years. That is how it stands here at the moment. I hope to hear from some of you soon."

JT1 Mongolia: JT1CA continues active 14105-10 kc 1100-1300 GMT s.s.b. and is to be there on an assignment lasting one year. Vlad reports he is receiving the different continents at best as follows (GMT): Africa 1400-1600; N. Am. 1100-1500; S. Am. 2000-2300; Oceania 0100-0300 and 0800-1100; Europe 1430-1630 and 0400-0800, though the first Europe times are the best. *(Tnx VERON)*

KJ6 Johnson Island: KJ6BZ seems to be most popular judging from pileups 14010-25 kc daily 1000-1200 GMT. *(Tnx WGDXC)*

KG6S Saipan: KG6SA has been somewhat active around 0700 GMT. Frequency preferred seems to be 14035.

KP6 Palmyra Island: W6FAY/KP6 will be on June 22 until mid-September, after which he will QSY to Jarvis Island and thinks it will count as a new one under the new ruling. *(Tnx WGDXC)*

OA Peru: OA4NKY, John (Juan) is on 40 s.s.b. 7200 to 7235 or so each nite-0230 to 0630 GMT looking for QSO & QSLs from W1, etc. Has plenty W6s but would like to make "WAS." Can work only 40. Has Mosley 40 beam, 100 w.d.c. input. QSLs air mail. *(Tnx W5DAU)*

TA Turkey: TA2NK (DJ7BO) According to reports, the Turkish problem is solved, in that, Wolfgang will be there for two years and is now active on 14040-60 kc daily 2100-2200 GMT. All QSLs should be sent via DJ2NY. *(Tnx WGDXC)*

VS9O Masirah: Jeff Rackstraw writes that club station VS9OC is on 15 and 20 regularly at 1500-1800 GMT, a.m. and c.w. Any of the gang requiring QSLs prior to 1963 should send full log info to the address shown in the QTH section.

ZL1 Kermadec Island: ZL1ABZ continues active weekends s.s.b. 14115-20 kc 0300-0400 GMT. *(Tnx ZL2GX)*

Gus

Gus Browning, W4BPD is in Calcutta as this is being written presumably with Cal, W4ANE. He might operate a bit from there, however, about July 20 Gus will be in Phouchling, Bhutan, about 18 miles from the Indian border. He will operate 5 to 7 days before going by pack-trail to the Capitol City (140 miles distant passing a corner of AC4-land) where he will install a 2-element beam and SR-150 for AC5PN and the King, to be left there permanently. This pack-train trip will take about 21 days and might have some interesting developments enroute, so watch 14034 kc. Gus has a 2 element beam for his own use and also a 30L-1 final, and a.c. power is available at AC5SQ and AC5PN's QTH so good signals may be expected if conditions permit. *(Tnx WGDXC)*

DXpeditions

South Sandwich-South Georgia & Falkland Islands — LU2XL, LU4BAD, LU4XG (LU8-DBA) and The Radio Club of Argentina are in the preliminary stages of plans for a DXpedition to these places, licenses have been applied for and private air-transportation is available to Carl, LU2XL, who is a Texan, currently engaged in some phase of oil activities in Argentina and will keep all informed of developments. *(Tnx WGDXC)*

EA2CA, EA4CR and EA4GF are getting the equipment ready to go to Ifni, Rio de Oro, Annabon, Fernando Po and Spanish Guinea. The starting date of this DXpedition is not known at this time. *(Tnx VERON)*

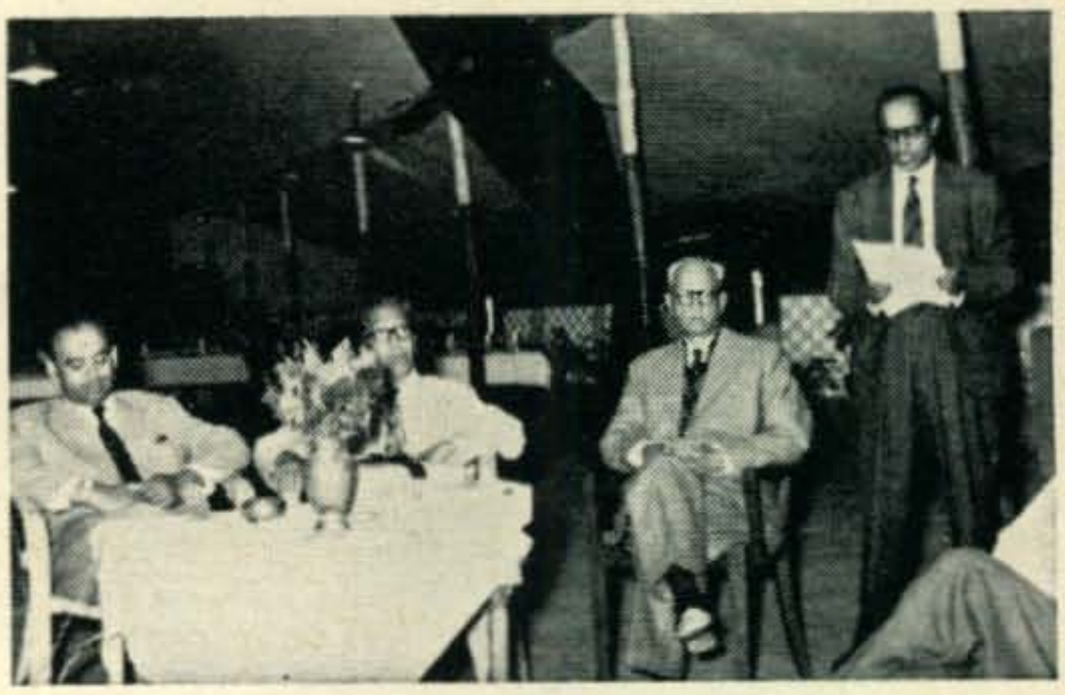
New England DXCC Meeting

The 13th Annual New England DXCC meeting will be held Saturday, September 21 in the Grand Ballroom of Motel 128, located at the junction of Routes 128 and 1, Dedham, Mass. "Bull Session" commencing at 5:00 P.M. with dinner at 7:30 P.M. Cost, $5.50 per person, deadline for reservations is Sept. 16th. All DXCC members are invited. Make reservations and payable to Howard H. Ferris, W1HZ, 18 Whittemore St., Concord, Mass.

W9-DXCC Banquet

The annual meeting and banquet of W9-DXCC will be held at the Sheraton Hotel, Chi-

[*Continued on page 90*]



Releasing of first issue of *SIRAN*, Bangalore Club's publication at the annual dinner by Chaki, VU2BU (Brig. B.M. Chakravarti). L to r: Chaki, VU2BU; Chas. ex-VU2EV; Joe, VU2JA and Sham VU2BZ reading the address of welcome. *(Tnx VU2GV)*

SPACE COMMUNICATIONS

GEORGE JACOBS*, W3ASK

THE following are recent additions to the list of satellite frequencies which appeared in last month's column.

Frequency (MC)	Name	Power (Watts)	Date Launched	Inclination (Degrees)	Period (Minutes)
136.235	TIROS-7	0.05	19 June 1963	58.5	97
136.380	LOFTI-2A	0.05†	15 June 1963	70	94
136.890	SR-4	0.05†	15 June 1963	70	94
136.922	TIROS-7	0.05	19 June 1963	58.5	97

†Estimated power, may actually differ slightly from this value

LOFTI-2A, launched by the USA on June 15, is conducting experiments in space of importance to radio communications. The 20-inch diameter spherical satellite, designed by the U.S. Naval Research Laboratory, contains a 40-foot antenna which was extended when the satellite entered its orbit. Also aboard the LOFTI-2A satellite is a 14-inch loop antenna and special low frequency (long wave) receiving equipment. The satellite is measuring trans-ionospheric low frequency reception on both the extended antenna and the loop antenna. It is hoped that these measurements will shed new light on low frequency propagation, and the ionosphere in general.

Launched on the same booster rocket with LOFTI-2A was the SOLAR RADIATION-4 satellite. This satellite, also designed by the Naval Research Laboratory, is intended to measure solar X-rays, and to study the effects of solar radiation and solar storms on the ionosphere.

On June 19, the USA successfully launched the seventh satellite in the TIROS weather satellite series. Like its predecessors, TIROS-7 carries two 2-watt TV cameras on board which scan the earth's atmosphere over millions of square miles, sending back to earth comprehensive pictures of cloud formations, weather fronts and other meteorological data. Both cameras operate on command on 235 mc.

TIROS-7, LOFTI-2A and SR-4 each contain c.w. beacon and command telemetry transmitters operating in the 136 mc band. The frequencies are shown in the above table, and widespread reception of these transmitters has been reported.

*11307 Clara St., Silver Spring, Md.

Telemaco Antonio Pissarro, CR6CW, shown at his satellite listening post in Cela, Angola, Portuguese West Africa. Tel uses a conventional home-built 6AM6-6J6-6AK5 converter into an old S40-A receiver, and a two-element beam cut for 136-137 mc. With this set-up, Tel has logged eight American satellites during the past year.

Project OSCAR News

Project OSCAR has moved from garages and home workshops to its new home at Foothill Junior College, located in the peninsular town of Los Altos, approximately twenty miles south of San Francisco, California. The College has made available to the Project a two-story building on the edge of the campus, provided with utilities (gas, electricity), including the necessary land to erect antennas. The building will house Project OSCAR headquarters as well as the Project's communication control center and main tracking station. Mail address for the Project will continue to be Box 183, Sunnyvale, California, U.S.A. The building has been made available by Foothill College as part of the College's plan to establish a Space Science Center which will also consist of a 16-inch optical telescope, a 28-foot radio telescope, and a planetarium (the latter is already in operation).

Work continues on the OSCAR repeater satellite. A land-based "bread-board" version of the repeater has been functioning for some time and various vexing problems are now being encountered as space hardware is being built for pre-flight tests and environmental studies. The primary power drain of the package has been reduced from 5 watts to approximately 2.5 watts at a slight sacrifice in translator output. Study of the linear amplifier stages of the package is

[*Continued on page 95*]

PROPAGATION

GEORGE JACOBS*, W3ASK

LAST MINUTE FORECAST

The following is a forecast of day-to-day propagation conditions expected during September, 1963. This forecast attempts to predict *specific* days upon which openings shown in the Propagation Charts in this column are most likely to occur, and the expected quality of the openings. For example, the following forecast shows that circuits rated (2) in the Propagation Charts are most likely to open with "good-to-fair" quality (B-C) when conditions are above normal (September 5, 11, 22 and 30), and with "fair-to-poor" quality (C-D) when conditions are expected to be normal. Circuits rated (2) are not expected to open on those days forecast to be disturbed, etc.

PREDICTED PROPAGATION CONDITIONS AND CIRCUIT QUALITY

Prop. Chart Forecast Rating	*Above Normal Days (WWV rating higher than 6)* Sept. 5, 11, 22, 30	*Normal Days (WWV rating 5-6)* Sept. 1-4, 6, 8-10, 12, 16, 18-19, 21, 23, 26-29	*Below Normal Days (WWV rating 4)* Sept. 7, 13, 15, 17, 20, 25	*Disturbed Days (WWV rating less than 4)* Sept. 14, 24
(1)	C	D-E	E	E
(2)	B-C	C-D	D	E
(3)	A-B	B-C	C-D	D-E
(4)	A	A-B	C	D

Where:

A—is an excellent opening with strong steady signals.

B—is a good opening, moderately strong signals, with little fading and noise.

C—is a fair opening, signals fluctuating between moderately strong and weak, with moderate fading and noise.

D—is a poor opening, signals generally weak, with considerable fading and high noise level.

E—is a very poor opening, or none at all.

SEPTEMBER is a month of changing short-wave radio propagation conditions. During the early part of the month conditions tend to remain the same as during the summer months, but towards the end of the month typical winter propagation conditions begin to be noted. Winter propagation conditions are characterized by higher usable frequencies during the daylight hours, lower usable frequencies during the hours of darkness, lower static levels, and generally stronger signal levels. During September, therefore, improved propagation conditions are expected on 15 and 20 meters during the daylight hours, and on 40, 80 and 160 meters during the hours of darkness.

*11307 Clara St., Silver Spring, Md.

On September 23rd the autumn equinox occurs. This is the day when the sun crosses the equator on its apparent travel towards southern skies. On this date, day and night throughout the world are of equal length. On long radio paths extending from the northern to the southern hemisphere (for example from the United States to Australasia) there is a propagation balancing effect during the equinoctial period, which exists for about a month on each side of the day on which the equinox occurs. On such circuits, overall ionspheric absorption is usually at lowest levels, static levels are low and signal levels high during this period.

VHF Ionospheric Openings

Meteor activity is at a low level during September, and sporadic-*E* propagation decreases considerably during the month. Some v.h.f. ionospheric openings may be possible, however, as a result of a seasonal increase in auroral activity, which usually takes place during September and the early fall. Check the "Last Minute Forecast" appearing at the beginning of this column for periods that are most likely to be below normal or disturbed during September.

Sunspot Cycle Progress

The sunspot cycle continues its slow decline towards a minimum level. Table 1 lists the smoothed sunspot numbers observed during the present cycle, which began in April, 1954. Table 1 also shows the smoothed sunspot numbers predicted by *CQ* for the remainder of the present cycle. According to latest estimates, a minimum value is expected sometime between November, 1964 and April, 1965. A smoothed sunspot number of 19 is predicted for September, 1963.

For a more detailed account of sunspots, what they are and how they influence high frequency radio propagation, see "The Sunspot Story, Cycle 19; The Declining Years" by George Jacobs and Stanley Leinwoll, which appeared in the April, May and June, 1961 issues of *CQ*. Reprint copies of this three-part article, in booklet form, are available for $1.00 a copy direct from *CQ*.

CQ DX Contest Special

According to W1WY, *CQ*'s CONTEST CALENDAR Editor, the following dates have been selected for the 1963 *CQ* DX Contest:

October 26-27 *CQ* WW DX Phone.
November 23-24 *CQ* WW DX C.W.

Next month's column will contain special Propagation Charts for the DX Contest.

This month's column contains Short-Skip Propagation Charts for September and October, 1963, as well as special propagation charts centered on Alaska and Hawaii, DX Charts for Sept. appeared last month.

73, George, W3ASK

TABLE 1

Values of smoothed sunspot numbers observed during Cycle 19 and predicted for the remainder of the decline. Italic figures indicate future estimated sunspot numbers.

Year / Month	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Jan	..	14	89	170	199	179	129	80	45	*28*	*14*	*5*
Feb	..	16	98	172	201	177	125	75	42	*27*	*13*	*5*
Mar	...	19	109	174	201	174	122	69	40	*26*	*12*	*5*
Apr	3	23	119	181	197	169	120	64	39	*26*	*11*	*5*
May	4	29	127	186	191	165	117	60	39	*25*	*9*	..
Jun	4	35	137	188	187	161	114	56	38	*24*	*8*	..
Jul	5	40	146	191	185	156	109	53	37	*22*	*7*	..
Aug	7	46	150	194	185	151	102	53	35	*21*	*7*	..
Sep	8	55	151	197	184	146	98	52	33	*19*	*6*	..
Oct	8	64	156	200	182	141	93	51	31	*18*	*6*	..
Nov	9	73	160	201	181	137	88	51	30	*17*	*5*	..
Dec	12	81	164	200	180	132	84	49	*29*	*16*	*5*	..

CQ Short-Skip Propagation Chart

September-October, 1963

Band Openings Given in Local Standard Time

Band (Meters)	*50-250 Miles*	*250-750 Miles*	*750-1300 Miles*	*1300-2300 Miles*
10	*Nil*	09-13(0-1)	07-09(1) 09-13(1-2) 13-21(0-1)	07-09(1-0) 09-11(2-0) 11-13(2-1) 13-17(1) 17-21(1-0)
15	*Nil*	07-09(0-1) 09-13(0-2) 13-21(0-1)	07-09(1) 09-13(2) 13-17(1-2) 17-21(1) 21-07(0-1)	07-09(1) 09-15(2) 15-17(2-1) 17-19(1) 19-07(1-0)
20	*Nil*	07-09(0-1) 09-12(0-2) 12-14(0-4) 14-16(0-3) 16-18(0-2) 18-07(0-1)	07-09(1-2) 09-12(2-4) 12-14(4) 14-16(3-4) 16-18(2-4) 18-20(1-3) 20-22(1-2) 22-07(1)	07-09(2) 09-12(4-2) 12-15(4-3) 15-18(4) 18-20(3-2) 20-22(2) 22-00(1) 00-07(1-0)
40	07-09(0-2) 09-11(1-3) 11-15(2-4) 15-17(2-3) 17-19(1-2) 19-21(0-1)	07-09(2-3) 09-11(3) 11-15(4-2) 15-17(3) 17-19(2-4) 19-21(1-4) 21-23(0-3) 23-02(0-2) 02-05(0-1) 05-07(0-2)	07-09(3-2) 09-11(3-1) 11-15(2-1) 15-17(3-2) 17-19(4-3) 19-21(4) 21-23(3-4) 23-02(2) 02-05(1-2) 05-07(2-3)	07-09(2-1) 09-15(1-0) 15-17(2-1) 17-19(3-2) 19-23(4) 23-02(2-4) 02-05(2-3) 05-07(3-2)
80	06-08(3-4) 08-21(4) 21-03(3-4) 03-06(2-3)	06-08(4-2) 08-16(4-1) 16-18(4-2) 18-21(4-3) 21-03(4) 03-05(3-4) 05-06(3)	06-08(2-1) 08-16(1-0) 16-18(2-1) 18-21(3-2) 21-03(4) 03-05(4-2) 05-06(3-2)	06-08(1) 08-16(0) 16-18(1) 18-21(2) 21-03(4-3) 03-06(2)
160	16-18(1-0) 18-20(2-1) 20-05(4) 05-07(3-2) 07-09(2-1) 09-11(1-0)	17-19(1-0) 19-20(1) 20-02(4-3) 02-05(3-2) 05-07(2-1) 07-09(1-0)	19-20(1-0) 20-22(3-1) 22-02(3) 02-05(2-1) 05-07(1)	20-22(1-0) 22-02(3-2) 02-05(1) 05-07(1-0)

Hawaii To:

*Openings Given in Hawaiian Standard Time**

	10/15 (Meters)	*20 (Meters)*	*40 (Meters)*	*80/160 (Meters)*
Eastern USA	09-12(1)† 07-12(1) 12-13(2) 13-15(3) 15-16(1)	03-05(1) 05-07(2) 07-12(1) 12-14(2) 14-16(3) 17-19(1) 16-17(2)	17-19(1) 19-21(2) 21-00(3) 00-02(2) 02-04(1)	18-20(1) 20-23(2) 23-02(1) 21-01(1)‡
Central USA	09-13(1)† 07-12(2) 12-14(3) 14-15(2) 15-17(1)	05-06(1) 06-08(3) 08-10(2) 10-13(1) 13-15(2) 15-17(4) 17-18(2) 18-19(1)	17-19(1) 19-21(2) 21-02(3) 02-04(2) 04-05(1)	18-20(1) 20-01(2) 01-03(1) 21-02(1)‡
Western USA	09-13(1)† 06-07(1) 07-09(2) 09-12(3) 12-14(2) 14-17(1)	06-07(1) 07-10(3) 10-14(2) 14-16(4) 16-18(2) 18-20(1)	17-18(1) 18-19(2) 19-00(4) 00-03(3) 03-06(2) 06-08(1)	18-20(1) 20-22(2) 22-03(3) 03-04(2) 04-06(1) 20-23(1)‡ 23-02(2)‡ 02-04(1)‡

*Hawaiian Standard Time is 5 hours *behind* EST; 4 hours *behind* CST; 3 hours *behind* MST; 2 hours *behind* PST and 10 hours *behind* GMT.
†Indicates possible 10 meter openings.
‡Indicates possible 160 meter openings.

Alaska To:

Openings Given in Alaskan Standard Time§

	15 (Meters)	*20 (Meters)*	*40 (Meters)*	*80/160 (Meters)*
Eastern USA	12-14(1)	09-13(1) 13-15(2) 15-17(1)	23-03(1)	*Nil*
Central USA	12-16(1)	09-14(1) 14-16(2) 16-18(1)	23-04(1)	*Nil*
Western USA	12-17(1)	09-11(1) 11-14(2) 14-16(3) 16-17(2) 17-19(1)	23-02(1) 02-05(2) 05-07(1)	02-05(1)

Forecast Ratings

The numerical ratings appearing in parenthesis following each predicted time of opening indicate the *total* number of days during each month of the forecast period the opening is expected to occur, as follows:

(1) Less than 7 days; (2) Between 8 and 13 days; (3) Between 14 and 22 days; (4) More than 22 days.

On the Short-Skip Propagation Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the longer distance.

For the *specific* days of each month on which a particular opening is most likely to occur, as well as a day-to-day forecast of reception conditions (signal quality, noise and fading levels), see the "Last Minute Forecast" which appears at the beginning of this column.

All times are shown in Local Standard Time, using the 24-hour system. In this system midnight is shown as 00, while 01 is 1 A.M., 02 is 2 A.M., *etc.* Noontime is shown as 12, while 13 is 1 P.M., 14 is 2 P.M., *etc.*

The *CQ* Short-Skip Propagation Charts are based upon a c.w. effective radiated power of 75 watts from a half-wave dipole antenna, a half-wave or higher above ground. The Charts are valid through October 31, 1963. These forecasts are based upon basic propagation data published monthly by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

§Alaskan Standard Time (from Skagway to 141 degrees west longitude), is 4 hours *behind* EST; 3 hours *behind* CST; 2 hours *behind* MST; 1 hour *behind* PST and 9 hours *behind* GMT.

sideband sideband sideband

SIDEBAND

IRV & DOROTHY STRAUBER*, K2HEA/K2MGE

SSB DX HONOR ROLL

TI2HP	282	G8KS	261	W6WNE	241
PY4TK	279	DL1IN	258	W1AOL	238
W8EAP	278	W5IYU	257	WA2IZS	235
W2ZX	275	K2MGE	257	PJ2AA	232
VQ4ERR	273	MP4BBW	256	W2VZV	227
W2FXN	272	W1LLF	254	K4AJ	226
K8RTW	271	G3NUG	253	G2PL	225
W8PQQ	269	W6BAF	252	K6LGF	224
W6UOU	266	G3FKM	252	WA6EYP	222
K4TJL	266	W6RKP	251	WØPGI	221
WØQVZ	266	WØUUV	251	WA6HOH	219
W4OPM	265	K1IXG	250	W3VSU	217
K9EAB	263	G2BVN	249	W7DLR	208
HB9TL	262	W3KT	248	VE3BQP	206
W2VCZ	262	W2TP	248	OH2NB	204
W3LMA	261	W8YBZ	246	W9SFR	203
PZ1AX	261	W6PXH	246		

SSB DX ENDORSEMENTS AND CERTIFICATES

W6RKP	250	W6NWZ	150	W2PDB	75
WØUUV	250	K1GHT	125	ZS6YQ	75
W6BAF	250	W2MM	100	W8OQV	75
K1IXG	250	K6RFU	100	WA2JBV	75
G2PL	225	W1DGJ	100	KP4AOO	50
W4ZRZ	200	W9OKM	100	K5QVH	50
W4NJF	200	K3BNS	100	K4RZK	50
K5YYI	150	W2FXA	75	TG9SC	50
KØMAS	150	W8WUO	75	WØEEE	50

WE are certain that you have read carefully Part 12 of the FCC regulations, perhaps some sections more carefully than others. One section in particular, 12.0, could do with a bit of re-reading at this time in light of the proposals recently outlined by the ARRL.

SEC. 12.0 Basis and purpose. The rules and regulations in this part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:

(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary non-commercial communication service, particularly with respect to providing emergency communications.

(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

(c) Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communication and technical phases of the art.

(d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians and electronic experts.

(e) Continuation and extension of the amateur's unique ability to enhance international good will.

The fundamental purpose and the principles outlined provide the basis for amateur radio. They are the reasons for the existence of amateur radio, the only hobby which is regulated by laws carefully spelled out and the only one that requires a government license.

Could it be that we have lost sight of these principles? Can it be that the time has come for

*12 Elm St., Lynbrook, New York.

As fine a station as one is likely to find in any part of the world belongs to Ian Wollen, 4S7IW, the only sideband station in Ceylon. *(Photo courtesy of WA6ZIQ)*

An indomitable experimenter with antennas is Fred Dodson, G3NVA, whose use of variations of the quad has brought him world fame. Fred's is often the lone signal coming through from the U.K. after every other G-station has faded out *(Photo courtesy of WA2WPP)*

Les Lyske, GI3CDF, is shown at his fine station in Portadown. Holder of 120 awards, including the first CQ SSB "Worked 75" certificate for 80 meters, Les' set-up includes the following: KW Viceroy Mark III, KW 500 linear, and the HQ-170 as well as an inverted V, a vertical, and a full-wave center fed antenna, all on 80 meters, and a 3 element beam for 20.

Roy Hearsum, W8LUZ, and his delightful XYL, Mickey, were responsible for much of the success of the Ex-G Club get-together at the Dayton Hamfest. *(Photo courtesy of W3HQO)*

a re-appraisal and that the proposals put forth by the ARRL are worthy of calm, thoughtful and sincere examination?

Fair is Fair

Within recent memory of us all, a bulletin was issued by the ARRL, denying credit for phone operation which took place within the c.w. portion of 20 meters (14.0 to 14.1). The furor aroused by this edict eventually simmered down and it is not our purpose to re-open old wounds. But it is our purpose to balance the scale and therefore we call attention to the dismaying trend on the part of American c.w. stations to operate above 14.1 in the DX s.s.b. portion of 20. Of late, we have heard a whole slew of W/Ks calling CQ incessantly, usually right on top of established sideband QSOs in this lower limit of the phone band or holding what seem to be local c.w. ragchews of interminable length in the area from 14.1 to 14.14. To zero beat their frequency on c.w. and ask them to please move only adds to the confusion and avails one nothing. How about it? If there is to be no phone operation interfering with c.w., then there should be no c.w. operation interfering with phone!

Cross Modulation and SSB

For best sensitivity a receiver should have as much gain as possible ahead of the mixers insuring that weak signals will override the internal noise generated in the mixing stages. Conversely, we would like to see little amplification at this point when receiving strong signals to prevent overloading of the front end of the receiver. Obviously we cannot have both without some compromise.

When a receiver is tuned to a weak signal and a strong signal is present close by and outside the passband of the i.f., a type of interference known as cross modulation exists. Since the selectivity of the r.f. section is less than the i.f., it will accept these strong signals. The i.f. section will not pass these strong signals and no a.v.c. action will be produced to reduce their amplitude. This will affect the operation of the r.f. amplifier and mixer stages and if they are strong enough will cause non-linear operation modulating the weak signal.

To minimize the generation of cross-modulation type of interference it is necessary to carefully select the tubes in the r.f. section, usually making it inadvisable to make changes in the r.f. tube of your receiver. The manufacturer has designed the circuit for the parameters of the tube he selected and any change might seemingly make your receiver perform better but might also create stronger cross modulation effects. Another help is the application of a.g.c. or a.v.c. to the first r.f. tube, since as the level of the weak signal is increased, the r.f. amplifier gain can be reduced, decreasing the amplitude of the interfering signal.

Cross modulation effects are not as troublesome in s.s.b. as they would be on a.m. since there is no carrier present to be modulated by the undesirable signals and the modulation is applied to each of the sideband signal components. As each s.s.b. signal consists of a number of relatively weak components, this undesired modulation is spread and when the s.s.b. signal is demodulated, the interfering signal is recovered as noise and is not as troublesome.

Teaching Old Dogs New Tricks?

After reading the editorial by Reg Cherrill, W3HQO, in the June, 1963 *Bulletin* of the Ex-G Radio Club, we paused in our summertime activities to give some thought to his suggestion that a "heavy program of education on operating procedures both here and abroad would do much to alleviate the conditions on the amateur frequencies these days." There is no question but that many operators offend with some of their techniques but how many, upon reading a series

[*Continued on page 92*]

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

CONTEST CALENDAR

FRANK ANZALONE*, W1WY

CALENDAR OF EVENTS

September	7-8	Peruano Phone
September	14-15	W.A.K.I. DX
September	14-15	S A C C.W.
September	21-22	S A C Phone
September	28-29	MARC VE/W
October	5-6	Oceania Phone
October	12-13	Oceania C.W.
October	12-14	ARRL CD C.W.
October	19-21	ARRL CD Phone
October	19-20	RSGB 7 Mc Phone
October	23-24	YL/AP C.W.
October	26-27	*CQ* WW DX Phone
November	2-3	RSGB 7 Mc C.W.
November	6-7	YL/AP Phone
November	9-11	ARRL S.S.
November	16-18	ARRL S.S.
November	16-17	RSGB 21/28 Mc Phone
November	23-24	*CQ* WW DX C.W.
December	7-8	OK DX C.W.

Peruano

Starts: 0001 EST Saturday, September 7
Ends: 2359 EST Sunday, September 8

This year's contest is limited to phone *only!* It's still a Pan American contest and operation therefore is confined to stations in the two American continents. The rules have been drastically changed and simplified.

1. You can use all bands but cross-band contacts are *not* permitted.
2. Serial numbers are of the usual five figure type, RS report plus a three figure progressive contact number starting with 001.
3. Each contact counts one point. (No mention of a multiplier was made).
4. Your log should show date and time; call of station worked; number sent and received; band used, and if a.m. or s.s.b. was used.
5. Awards evidently are on an over-all basis. 1st place gold medal and diploma, 2nd place silver medal and diploma, 3rd place bronze medal and diploma, 4th and 5th place diplomas. Diplomas will also be awarded to the three highest scoring YLs.

Include a summary sheet with your log with your call, name and address and other pertinent information.

Mailing deadline is October 15th and they go to: Radio Club Peruano, Att: G. Chirinos, OA4PX, P.O. Box 538, Lima, Peru.

S A C

C.W.

Starts: 1500 GMT Saturday, September 14
Ends: 1800 GMT Sunday, September 15

Phone

Starts: 1500 GMT Saturday, September 21
Ends: 1800 GMT Sunday, September 22

This is the fifth Scandinavian Activity Contest and this year is being sponsored by the SRAL, (Finland) the original sponsor of this activity. Each Scandinavian country takes turns running the contest.

For contest purposes the following prefixes will be considered as a country multiplier: LA, LA/p, OH, OHØ, OX, OY, OZ and SM/SL. A total of eight for each band.

Complete details were given in last month's CALENDAR.

Mailing deadline is October 15th. This year your logs go to: SRAL Contest Committee, P.O. Box 306, Helsinki, Finland.

W.A.K.I. DX

Starts: 0600 GMT Saturday, September 14
Ends: 0600 GMT Sunday, September 15

This is the first contest ever held in the Marshall Islands and is organized by the Kwajalein Atoll Amateur Radio Club.

1. Use all bands, 3.5 through 28 mc. On 40 meters the KX6s are confined to 7.0 to 7.15 mc. (Phone 7.1 to 7.15 mc).
2. Both c.w. and phone can be used but keep a separate log, as awards will be made for each mode.
3. Serial numbers for non-KX6s will be the RS/RST report plus QTH; (State, Province or Country). The KX6s will send the RS/RST plus a two letter abbreviation indicating their island QTH. (ET, EY, KJ, MO, PY, RN and possibly an uninhabited island, EB or GU).
4. For stations outside the Marshalls each contact counts ten (10) points. The same station can be worked only once on each band.

*14 Sherwood Road, Stamford, Conn.

5. The multiplier for non-KX6s will be the number of different islands worked on each band, each worth five (5) points. Non-KX6s will indicate their state, province or country for multiplier purposes.

6. The final score therefore will be the total QSO points multiplied by the total multiplier points on each band.

7. Awards will be made for both c.w. and phone to the highest scoring station in each country, U.S. call area and Canadian province. In addition, the Worked All Kwajalein Island (W.A.K.I.) certificate can be gained by any station if his log shows QSOs with five (5) different Kwajalein (KJ) stations. (Include 4 IRCs with your log for this award).

8. Your log should show data in this order: Date & time in GMT; station worked; serial number sent and received; handle; band used, and QSO points. Logs go to The Contest Committee, Box 444, c/o Navy 824, FPO, San Francisco, Calif.

MARC VE/W

Starts: 1800 EST Saturday, September 28
Ends: 2400 EST Sunday, September 29

The Montreal Amateur Radio Club is once again sponsoring this popular Canadian/U.S. party.

Although the contest period extends over 30 hours, you're only limited to 20 hours of operation. Therefore, it is essential that *on* and *off* times are clearly indicated on your log.

It's the VE/VOs working the W/Ks (and North American possessions) and visa versa.

1. Each completed contact counts two (2) points. The same station can be worked twice on each band, once on c.w. and once on phone.

2. The multiplier for W/K stations is rather complicated and unless you have a computor you had better read the following closely. There are four separate stages. (*a*) Number of VE sections worked, a maximum of ten, VE1-VE8, VEØ & VO. (*b*) 6.60, the ratio of U.S. to Canadian sections. (*c*) 2.5 provisional multiplier, based on the ratio of U.S. to Canadian logs received in previous contests. (*d*) Power multiplier, 2 if input is less than 30 watts; 1.5 if less than 100; and 1 for power inputs over 100 watts.

EXAMPLE for W/K stations: Contact points × VE sections worked × 6.60 × 2.5 × appropriate power multiplier for final score.

3. Only single operator operation is permitted.

4. Your log should show in this order: On the "receive" side, date/time, contact number, station worked, RS/RST, and ARRL section. On the "send" side, your message number and RS/RST sent. Columns showing type of emission, band used, sections worked and QSO points would also be helpful. And don't forget to indicate *on* and *off* times.

5. Certificates go to the highest scoring station in each ARRL section, and a trophy to the over-all winner.

You are expected to score your own log and check for duplicate contacts. Include a summary sheet giving all the essential information. Call, ARRL section, name and address, number of operating hours, power used and equipment description.

Also include and sign the following declaration: "I hereby state that my station was operated strictly in accordance with the rules of the contest and governmental regulations and I agree to abide by the decision of the Contest Committee."

This year your logs go to: Gordon H. Webster, VE2BB, 1550 Erin Place, Dorval, Quebec, Canada.

W9NLJ expects to be active from Prince Edward Island during the contest. Although this only counts as VE1 for the contest, it does make P.E.I. available for the WAVE award. So look for W9NLJ/VE1 beginning September 24th and during the contest week-end.

Results Pakistan 1963 DX Contest

Our friend Mohd, AP5CP considered the contest a great success, in spite of the fact that it was on the same week-end as the ARRL DX fracas and that this was the first time it was held.

Handsome certificates are being mailed to the following USA stations: K2LWR, K2ZZH/MM, W3CRA, W3MSK, W4BOM, W4KFC, W4LDL, W4LVV, K5CDA/MM, K6EVR, W8MPW, W8PQQ, W8VSK, W9ADN, W9EWC, W9HT, KØYND, WØDU and WØPNQ.

Ed. Note

Trying to keep an informative and accurate "Calendar of Events" gets to be quite a frustrating job.

Last minute announcements, (some received after deadline) means rushing the copy to the printer. In one case, conflicting information made it necessary to scrap the original copy and rush the new material in order to make the deadline. The announcement of a new activity for September never did make the deadline and therefore remains unpublished.

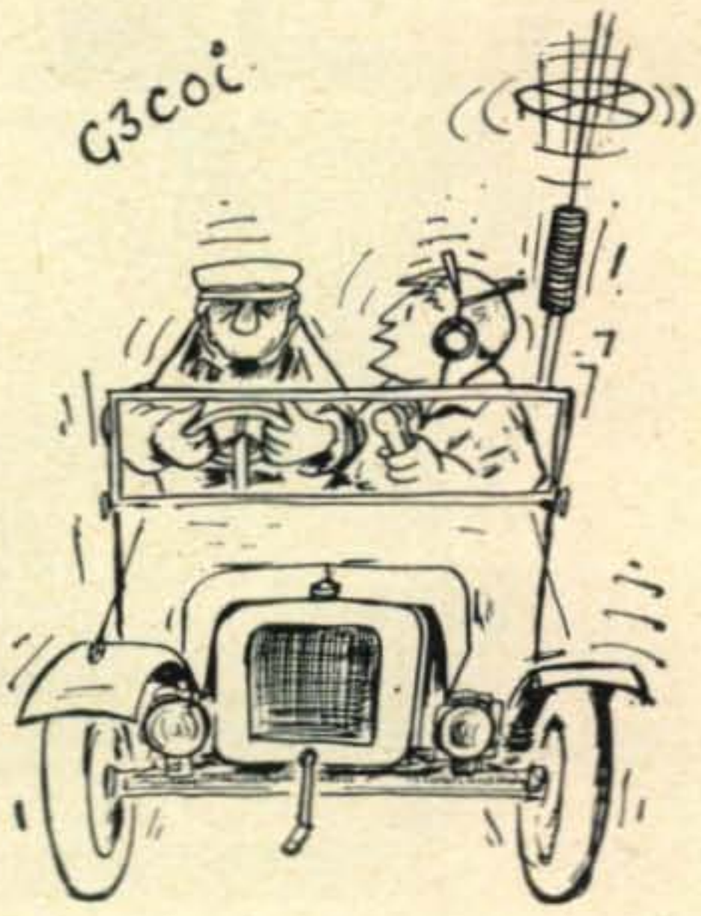
What more can I say to impress all concerned: We *must* meet a deadline at the printers!

To make the September 14/15 week-end more confusing, the Western Pennsylvania DX Society wants us to announce a DX QSO Party for that date. Club members will be on to afford overseas amateurs an opportunity to complete their "Suits" for the "Hearts & Diamonds" club awards. Write to W3GJY, P.O. Box 206, Conway, Penna. for more information.

It's time you start planning for the real BIG one, our own World-Wide DX Contest. No changes in the rules. We are going to give the 2-point North American contact and the 0000 GMT starting time another whirl. OK Roger, down boy.

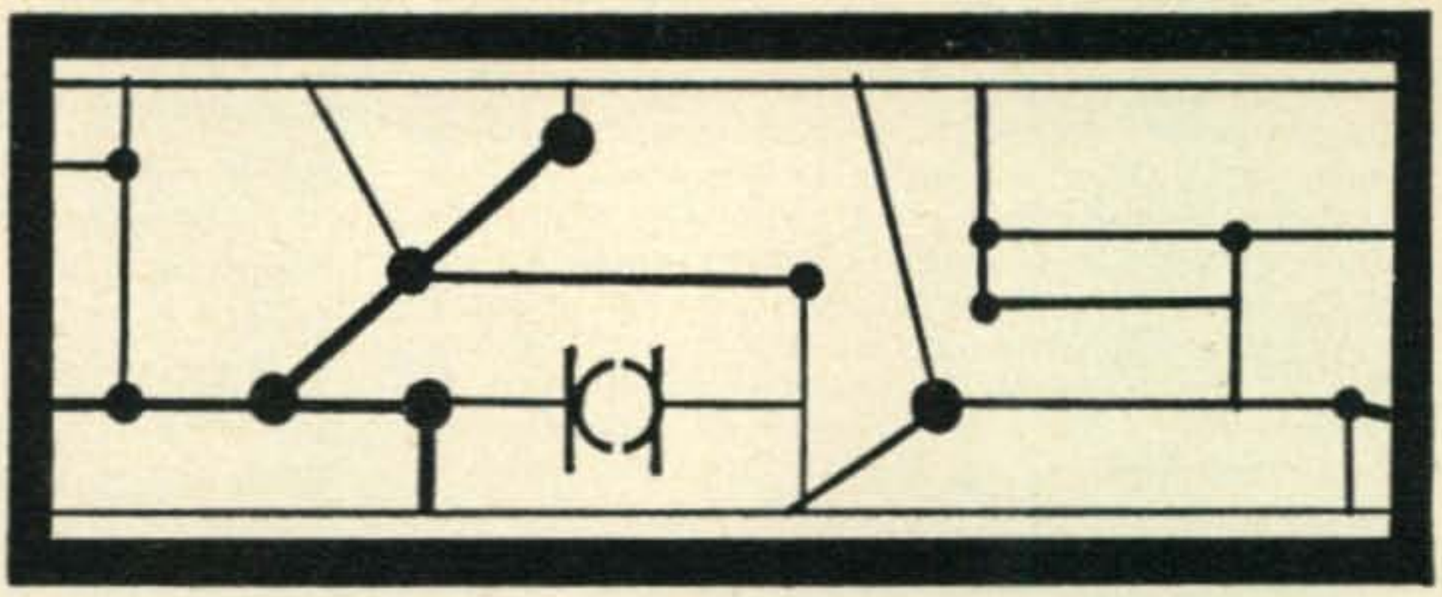
See page 46 for the official announcement.

73 for now, Frank, W1WY



. . . . . chap here says we have f.m. . . . . .

NOVICE



WALTER G. BURDINE*, W8ZCV

I HAVE just returned from the West Virginia State ARRL Convention held at Jackson's Mill, West Virginia. Cliff Apple, K8BUG, Sylvester Glancy, K8ACD/K3WOP and myself flew a Cessna 170-B over on Saturday morning and flew back Sunday afternoon, there is an emergency landing field adjoining the 4-H State park where the meeting is held and this is maintained by the State. The landing field is in excellent condition and we had 6 or 7 aircraft landing there this time. Jackson's Mill is about 25 miles south of Clarksville. We met some of the most wonderful people there and at night we had the most beautiful full moon that I can ever remember seeing.

Sam Harris, v.h.f. editor of *QST* was there and led an excellent session. It was generally conceded that more articles for the beginning and the serious v.h.f. operator should be written and published by our better operators. All agreed that the ham who builds his equipment is likely to be a better operator and have more pride in his equipment and operating ability.

*R.F.D. 3, Waynesville, Ohio.

Members of the Metropolitan Ragchewers Club help a Wheelbender get his transmitter in operating condition. See Story in text.

The last week-end in June was Field Day weekend and I participated with the v.h.f. group of the Defense Electronics Supply Center, as captain of the two-meter team, and can say we did well. We did have our share of trouble, which indicated that equipment must always be kept in good condition to survive the rigors of a 24-hour stint. That kind of test sure brings out the bugs in our equipment. My equipment continued to make *daily* contacts for 3,002 days and kept right on going. It sure was a sorry lot that went home Sunday afternoon; unshaven, unbathed and near exhaustion, but happy with a job well done.

We left all the operating to our new members when contacts became scarce but they got the idea that this was serious business and put in lots of hard work. All who were present decided we would be better prepared next year and better equipped.

Some Random Ideas

The line of Heathkit v.h.f. transmitters known as the "Tener," "Sixer" and "Twoer" have the best little transmitters I have ever heard. Coupled to a good beam they do remarkably well and the quality of the signal is good. The superregenerative type receiver, while being very sensitive has its drawback in having poor selectivity. This doesn't bother the ham who has no nearby neighbors, but it does cause plenty of trouble to the city ham. I wonder about the idea of using one of W6TNS's small transistorized converters and changing the present Sixer or Twoer coils to tune about 20 to 24 mc for an i.f. strip. The power for the converter could come from the cathode of the modulator tube but would require more filtering, or it could be furnished by batteries.

Another idea for the same set is to use the r.f. amplifier and detector as a converter by adding a transistor oscillator and feeding it into the grid of the detector, thus making a regular crystal controlled converter. I have tried this on the Lafayette HE-35 using a Nuvistor oscillator and it works very well. The result is that you have a self contained crystal controlled converter and transmitter in one small case and there are no switching complications. You can use your regular low-frequency receiver to tune

the band chosen. I guess I'll have to get a Sixer or Twoer to try this one.

Silicon Rectifier Circuits

Last month we discussed how to use a single surplus transformer to obtain a wide variety of output voltages. This month let's look at rectifier circuits that will enable us to use those a.c. voltages to our advantage.

Most surplus gear taken from aircraft requires a filament supply of 28 volts d.c. In fact, with some units containing dynamotors, a single 28 volt d.c. supply will put the entire rig in operation, high voltage included. Fig. 1 shows a low voltage, high current supply delivering about 28 volts at 5 amps, well enough filtered for most surplus work. The 30 volt transformer hookup shown last month is used.

Figure 2 shows a simple voltage doubler that will take the 120 volt a.c. hookup shown last month and deliver around 250 v.d.c. at over 500 ma. Not too much filtering is shown so if it is to be used with receivers or audio amplifiers, additional filtering should be added. Figures 3A and 3B show other voltage doublers also working from 120 v.a.c., but delivering both positive and negative outputs (relative to ground). These should prove handy for supplying small transmitters requiring bias supplies also. Again, little filtering is shown and more will be needed.

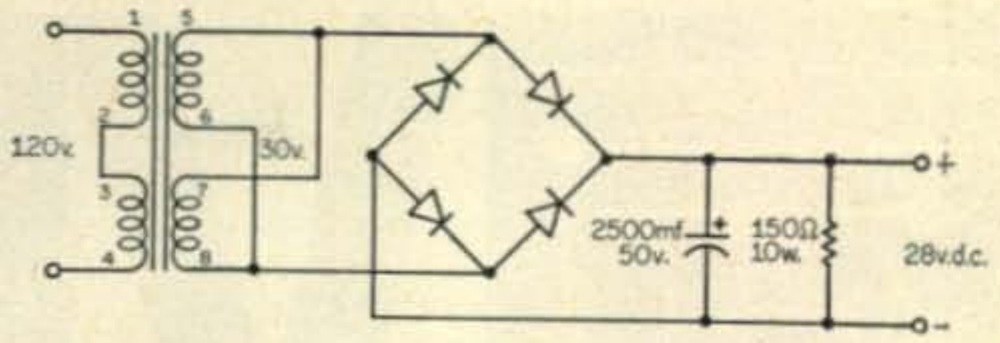


Fig. 1—Power supply suitable for operating the filaments of much surplus gear requiring 28 volts d.c. The silicon diodes may be 1N1341's (50 p.i.v., 6 a.).

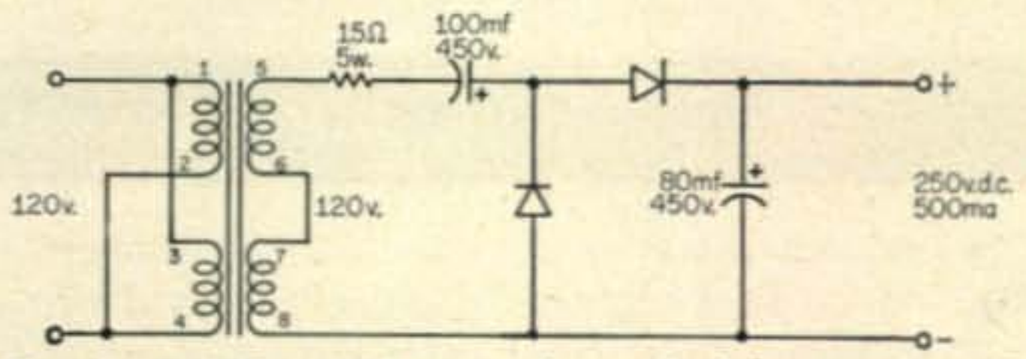
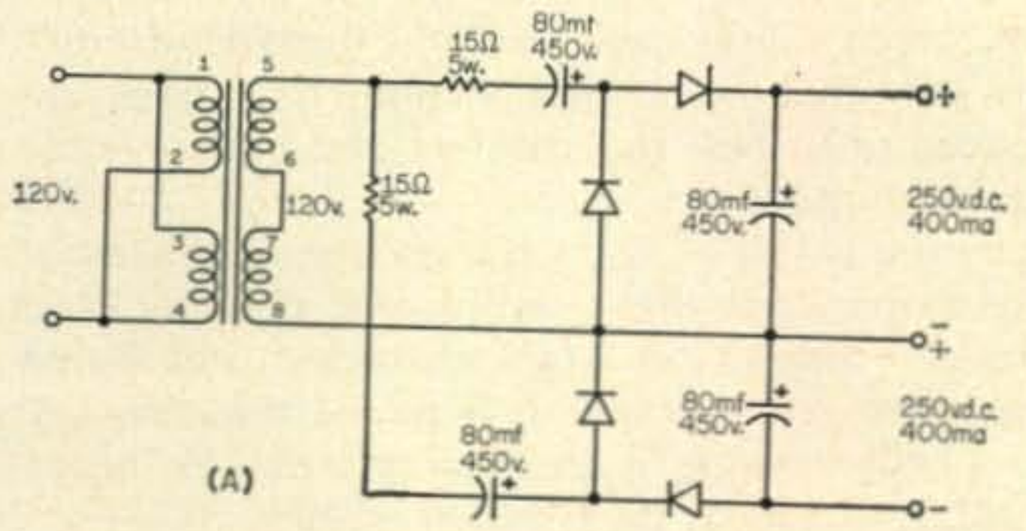


Fig. 2—A 250 v. 500 ma voltage doubler type supply. Diodes may be 1N553's or other 400 p.i.v. 500 ma types.



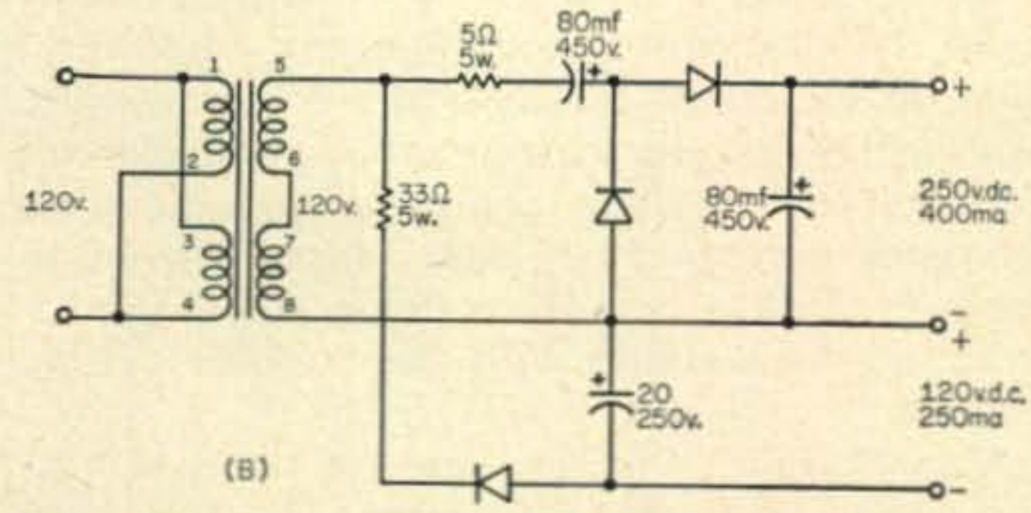


Fig. 3—Two examples of plate and bias supplies from a single transformer. Diodes are 1N533's (400 p.i.v. 500 ma).

Letters

Nevada has written! Not many letters from Nevada because there just aren't many hams in there. "Dear Walt: KN7TRG, Tony Morgan and I, KN7WLK Norm Thompson just took our Conditional exams together and both passed. We know a lot of hams need Nevada for WAS or USA-CA and we would be glad to schedule anyone. Tony is 13 and I am 15. Tony's equipment consists of a Challenger, Mosely CM-1 receiver, Hy-Gain 14AVS vertical and a Heathkit HG-10 v.f.o. I will use a Knight T-60, SX-101, and a Knight v.f.o. when our tickets come through. We are both members of the Las Vegas Radio Amateur Club and have our complete Collins S-Line in room 202 at the Thunderbird Hotel. We also have a TH-4 beam and a 72-foot tower. 73, Norm and Tony, 6228 Dayton Avenue, Las Vegas, Nevada."

On this next letter, I'm afraid that I won't be able to express myself well enough without using too many superlatives. Bob Hitchcock, WA8-GJM of Detroit wrote me about the Metropolitan Ragchewers Club and their activities. I think they have hit upon one of the best ways to tell the world that the ham is not a selfish egomaniac that enjoys ruining the local television shows and show that they have the good of all people at heart; they are the kind of people that will help one less fortunate than themselves.

The motto of the MRC is, "Dedicated To The Handicapped—So That They May Live Again Through Amateur Radio." That, gentlemen is a sermon unto itself and one that many of us might do well to heed. Apparently their actions speak louder than words from the newspaper clippings sent with the letter. The club has about 150 members and of these about 20 are handicapped. Dues are $3.00 for a Regular and $2.00 for Associate membership. They use the money to buy and build equipment which they lend to a new licensee until he can obtain his own equipment. When permitted, they will install equipment in the hospital rooms of hams so that they may keep in contact with the outside world *via* ham radio. Their headquarters is located in Lakewood House on the Detroit River at the foot of Lakewood. Space has been made available by the Detroit Department of Parks and Recreation and is supervised by Recreation Director, Earl Rissman.

The club is especially interested in signing up handicapped men and women to teach them a valuable way to spend their idle time. The first chapter of this club is known as the R. H. Peter-

[*Continued on page 100*]

VHF

DONALD L. STONER*, W6TNS

STARTING this month, the VHF column embarks on a slightly different format. In reviewing the current information available to active v.h.f.'ers, it becomes obvious that little, if any, of the material is of interest to those on the West Coast. In particular, the *QST* column has been swamped with "Ruttydendrums" and many v.h.f. accomplishments have gone unnoticed or at best inaccurately and incompletely reported upon.

Virtually, all of the v.h.f. accomplishments of any importance have originated on the West Coast in spite of the worst obstacles to be found anywhere in the States. It is hoped that this column will become a meeting ground for those wishing to add to these accomplishments.

Fresno—During the recent Fresno convention, I had the pleasure of attending an informal meeting of the most prominent and active v.h.f. operators on the coast. It was also a rather historic occasion in that the various groups and individual operators reached complete agreement on polarization, frequencies, and so forth. The group was uananimous in making this a yearly get together in conjunction with the popular Fresno hamfest.

Alan Margot, W6FZA, kept the lively discussion from going off on tangents. The following important points were agreed upon at Fresno:

1. 144.05 is to be kept clear for beacon stations transmitting from outside California. Anyone trying to lob a signal into W6—land should use 144.05 and listen for replies on the same frequency.

2. The local calling frequency for 220 is to be 221.5 mc. DX work will be conducted on 222.000 mc.

3. Antenna polarization on 432 is standardized on vertical. Polarization on 1296 is also vertical as empirical evidence indicates this results in reduced radar interference.

Bill Pandratz, W6TZJ, showed his beautifully constructed 50 mc s.s.b. generator which extracted techniques employed in the 144 mc rig recently featured in *GE Ham News*. Bill used coax phasing lines to replace many of the tuned circuits and performance was reported to be excellent.

Long Beach—The first annual V.H.F. Jamboree presented by the Long Beach Microwave Society is now history and quite a jumping affair it was. One of the highlights was the 3300 mc "Rockloc" system demonstrated by the San Bernardino Microwave Society, Inc. Rockloc, developed by SBMSI, and demonstrated by Ed, W6OYJ, is an ingenious method of permitting crystal stability and duplex operation on the microwave frequencies. The basic idea is shown in the block diagram, fig. 1. The heart of the system is a Klystron used for local oscillator and transmitter. 3300 mc signals are heterodyned down to a 30 mc f.m. i.f. strip (BC-604 tank receiver) for amplification. With the a.f.c. switch in the RELATIVE position, the incoming signal is locked in by a.f.c.'ing the Klystron repeller with the discriminator voltage. Duplex operation is possible simply by modulating the repeller and using the SBMSI developed polaplexer for isolation. Thus, the transmitted and received signals are always 30 mc apart. So

*Alta Loma, California.

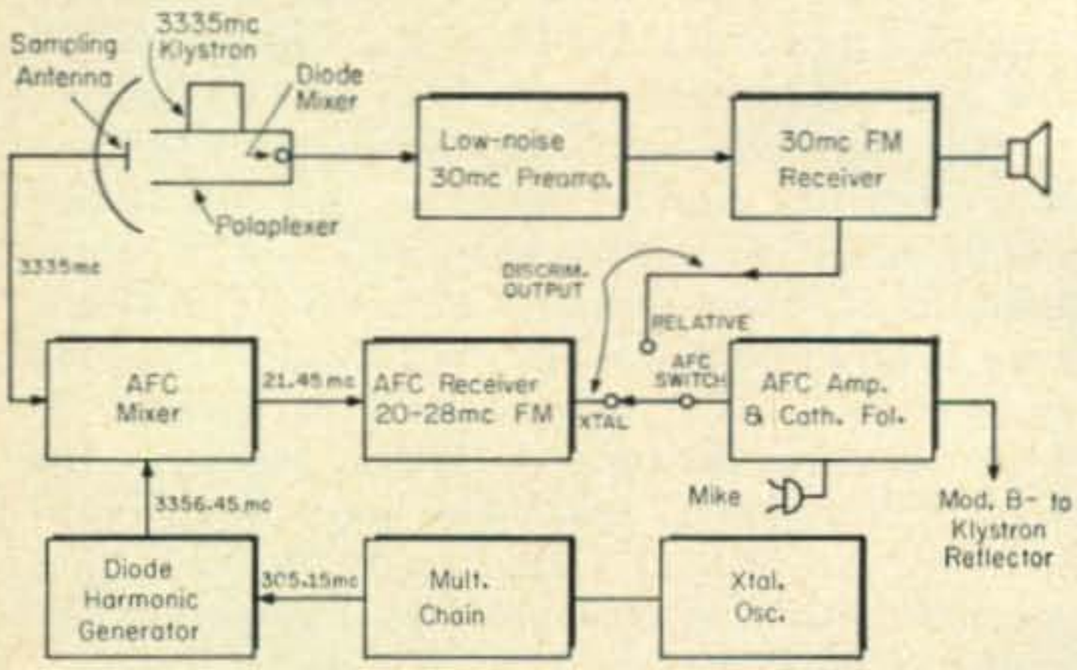
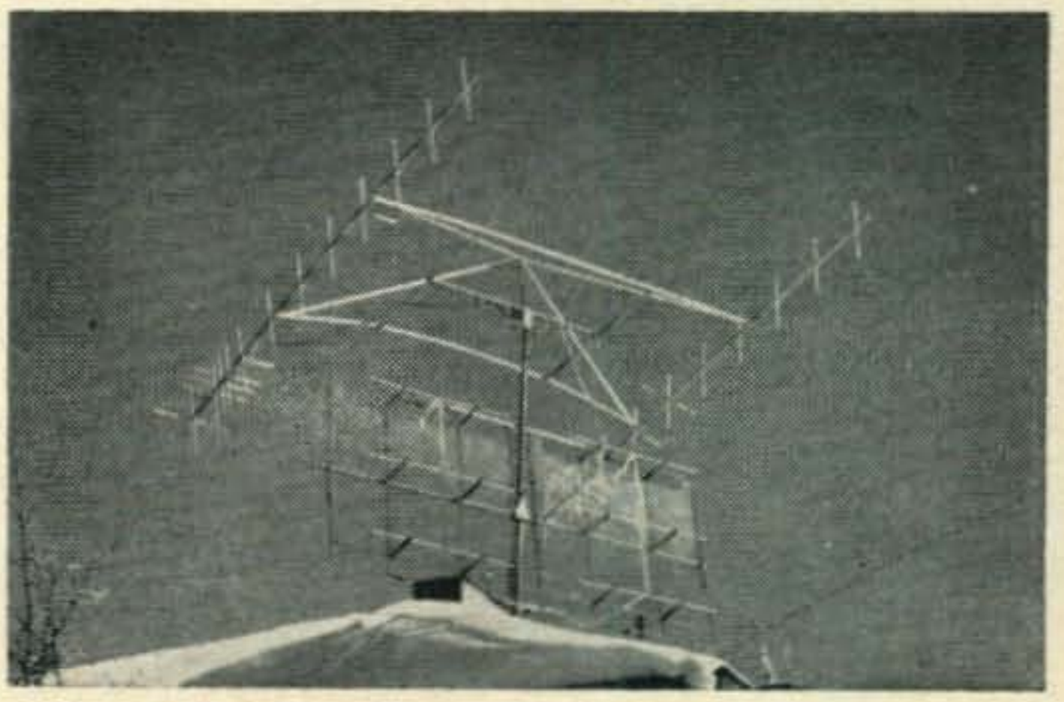


Fig. 1—3300 mc "Rockloc" station as used by members of the San Bernardino Microwave Society. The transmitted signal is at 3335.0 mc while the received signal is at 3365.00 mc, the difference of 30 mc being received by conventional means.



The antenna system at OH1ML's QTH.

VHFers get-together at Fresno. You can always tell the executives by the fact that they wear ties. Front row, l. to r. W6's CDT, GDO, FZA, ZUP, NGN, K6YIL, W7ZQX. Rear, l. to r. W6TNS, K6UQH, WA6FJX, WA6MGZ, K6SDZ, W6???, W6GGV, K6QXY, W6DNG, K6KFF, W6IZU, K6???, K7AAD, K6GVB, K7UZK, W6CBR, K6GOX, K6RNQ.

far, the system is conventional. However, for serious DX work, better frequency control and accuracy are required. The Rockloc system is so successful in this regard that a Drake 2B is coupled into the 30 mc i.f. strip to obtain super selectivity. Rockloc works in this manner: A crystal oscillator and diode harmonic generator are used to create a signal at 3356.45 mc. This is mixed with a sample of the transmitted signal on 3335 which is picked up by a sampling antenna located near the throat of the polaplexer. The resultant signal on 21.45 mc is amplified by an a.f.c. receiver (another BC-603 tank receiver).

By changing the a.f.c. Switch to the XTAL position the repeller is a.f.c.'ed by the discriminator output of this receiver. Any transmitter drift from the 3356.45 reference is thereby corrected thus providing the equivalent of crystal control.

Attesting to the performance of this system is the fact that this group has been able to "knife edge" signals from the Pomona Valley into the Victor Valley over a 10,000 foot range of mountains! This is a good trick on 144 mc and a superb accomplishment on 3300 mc. They demonstrated a rock solid signal between Pomona and the Hotel Lafayette in Long Beach. Even without the smog, and other man-made obstacles, this was an impressive feat.

Personality—All v.h.f.'ers are well aware of the historic accomplishments of John Chambers, W6NLZ, in contacting KH6UK direct, on two meters. Those skeptics who thought Indians were still scalping settlers in California surely must have conceded we were civilized when the EIMAC gang succeeded in bouncing a signal into the swamps of Massachusetts via the moon.

However, because of disbelief on the part of the ARRL and the extreme modesty of W6DNG, few people have ever heard of Bill Conkel. Long before these historic v.h.f. landmarks occurred, Bill was experimenting with moon bounce and obtaining excellent echos. This was done without any partner or encouragement until Bill met up with Ned Conklin, K1HMU.

Ned shared Bill's interest and although handicapped by college studies and limited operating time, K1HMU and W6DNG had many two meter contacts and exchange of reports via the moon. Bill has recorded many reels of tape of K1HMU signals and they have exchanged tapes. They made fascinating listening and produced far away expressions in the eyes of avid v.h.f. addicts.

Through Ned and subsequent correspondence, Bill met Lenna Suomenen, OH1NL, of Nikkila, Finland. Len also shared Bill's interest in moonbounce and the two amateurs agreed to conduct moonbounce experiments between Finland and California. The first signals were received during the winter of 1961 and two-way contact was established for certain in March of 1962. Again tapes were made to document the occasion and they are superb. I first heard them at Fresno. Even I could copy the calls and signal reports and I am not particularly known for my c.w. prowess. On one signal burst the receiver is obviously mistuned (the ringing and c.w. pitch don't match) and yet the signal is Q5 copy.

If it were anyone other than Bill Conkel, one might turn a skeptical eye toward the spinning reels on the recorder. However, anyone who has the good fortune to know W6DNG will vouch for the fact that anything he does is "the real McCoy."

Unfortunately, virtually nothing on Bill's record shattering two meter contacts with Finland have appeared in *QST*.

In case you are forming mental pictures of an exotic set-up at Bill's QTH, refocus, friend. Bill lives smack dab in the middle of a congested residential district. The power line noise level is unbelievably high. His transmitter is a straightforward kilowatt and is located in his shack, about 100 feet from his antenna system. The receiving system consists of a 416 preamp, converter and a modified 75A-4. Bill has worked up a system for regenerating the signal which appears to produce a good 10 db increase in the signal to noise ratio and also a.f.c.'s the receiver

[*Continued on page 94*]

the USA-CA PROGRAM

CLIF EVANS*, K6BX

JOHN Thomas Laney III, K4BAI, came in for USA-CA-1500 number two; following K9EAB who grabbed off number one as reported last month. Runners up for the month ending 30 June, winners of USA-CA-1000, were WØMCX, Art Jablonsky, and VE3BKL, Homer T. Houser, for numbers 11 and 12 respectively. Indicative of vacation months, only three winners of USA-CA-500 came in as shown below:

USA-CA HONOR ROLL

500		1000		1500	
K8ZNI	239	WØMCX	11	K4BAI	2
W4HOS	240	VE3BKL	12		
W8NXN	241				

Of interest on the above, W4HOS was for all c.w. and K8ZNI was for all Novice c.w. operations; others were for mixed operations.

Nuclear Power Award

Word from Tom, W4TDT, says 112 applications to date from those who have contacted the three military nuclear powered amateur radio stations while they are actually operating on nuclear power. See story in July, 1962 issue of *CQ* page 55.

Latest information on these three stations is: KC4USV now being heard on 7205 kc from 0600 to 1200Z. KG1CC now on 14335 kc from 1200 to 2000Z. KL7WAI operates around 14320 at various times and has been heard around 2100Z. The Nuclear Power Plant at Camp Century, KG1CC, is scheduled to be removed after March 31, 1964, so anyone still needing that contact should search with beams in that direction.

Tom reports many errors in mailing to Custodian. Correct QTH is Fort Belvoir Amateur Radio Club, P.O. Box 146, Fort Belvoir, Va.

Tip to Mobilers to Rare Counties

Many mobilers headed for rare county expeditions have asked what frequencies the hunters hang out on. Our best answer would be for them to use CHC hangout frequencies (plus or minus 5 kc) and call "CQ RARE CTY." **AM:** 3810, 7235, 14250, 21,330 kc. **SSB:** 3990, 7205, 14340, 21440, 28690 kc.

20-K Award Changes Sponsorship

The 20-K Award for working 20 different U.S. Areas and Possessions with K Prefix, previously sponsored by W1AGS, is now sponsored by *The Directory of Certificates and Awards.* This writer is Custodian. Rules remain unchanged. For information send s.a.s.e.

White Stick Award (Blind Hams)

It is with pleasure we announce the White Stick Award sponsored by the White Stick Amateur Radio Club for working at least 50 blind amateurs with no more than 10 in own country and with contacts after January 1, 1963. QSLs must show that operator is registered as being totally blind. Send GCR (certified) list and fee of $1 or 10 IRC to Custodian, GI6TK, Frank A. Robb, 125 Downshire Road, Hollywood 14, Co. Down, Northern Ireland.

There is a story behind this one. Sparkplugging the WSA is the Custodian, GI6TK, Frank, who, as a blind ham, has excelled in many fields and wished the world to meet other blind hams who also are contributing to society in notable manner regardless of what some folks consider a handicap.

Every blind ham in the world is automatically a member of the White Stick Amateur Radio

*United States of America Counties Award Custodian, Box 385, Bonita, California.

Here is the beautiful Washington CHC Chapter 15 Award picturing the 14,410 foot ice crowned volcanic cone that dominates the skyline of Mt. Rainier National Park. To get this beauty one must work members of Chapter 15 as follows; W/VE work 8; DX work 5, DX no charge; W/VE send 50¢. Seal for 12/8 members with s.a.s.e. Send GCR list to Custodian, W7NNF, 18150 N.E. 60th Place, Seattle 55, Washington. Members: K6BX; W7CNL, CSW, DZB, NNF, NRB, OEB, UVR, YFO, COG, JWE; K7NHG, BJE, UXN, BVZ, RAM, KSF, OFW, OFX, QOM, JRE, PVF, PVG.

Pictured here is Andy Rugg presenting number one C-150-C award to Fred Woodley at the May 11-12, 1963, Canadian DX Club Convention in Kingston, Ontario. Standing left to right are Andy, Fred, Garry Hammond, and Bob Viau; kneeling is Rodger McNicoll. See picture caption story about the C-150-C award.

S.w.l.er 11-10280, Leonardo Papis of Varese, Italy wrote expressing his thanks to George, W3DPM who recently sent him a gift of an expired *Call Book*. We have hundreds of DX s.w.l.ers working for the USA-CA award who have requested a gift of an expired *Call Book*, so, if you have one, not over two-years old, send s.a.s.e. to K6BX for a name.

Club . . . all that is necessary is that calls be registered with GI6TK, so folks, send along the calls of all known blind hams to him. Let's help Frank eventually list every blind licensed ham in the world, and we hope later to publish the list.

Why are we so enthused . . . we were once considered hopelessly blind . . . by a miracle of surgery, we regained partial vision in one eye . . . we operated blind for over a year and we learned the 'sight' and 'vision' ham radio gives to the blind. We know also that the blind ham does not consider himself handicapped simply because he has will to excell the average by his very perceptiveness in human relations.

Let's take GI6TK as example . . . blind, yet he has flown as Navigator and Radio Officer on the Test Flying team of a well known aircraft firm in Belfast, N. Ireland since 1937. He has actually been directly associated in the test-flying of scores of aircraft including *Mayo/Mercury, Bombay, Hereford, Stirling* Mk I, II, & III, C-Class Flying Boat, *Sunderland* Mk I, II & III, *Solent* Mk III & IV, *Britiannia* Mk I & II, *Sandringham, Shetland, Plymouth, Sealand, Camberra* and others.

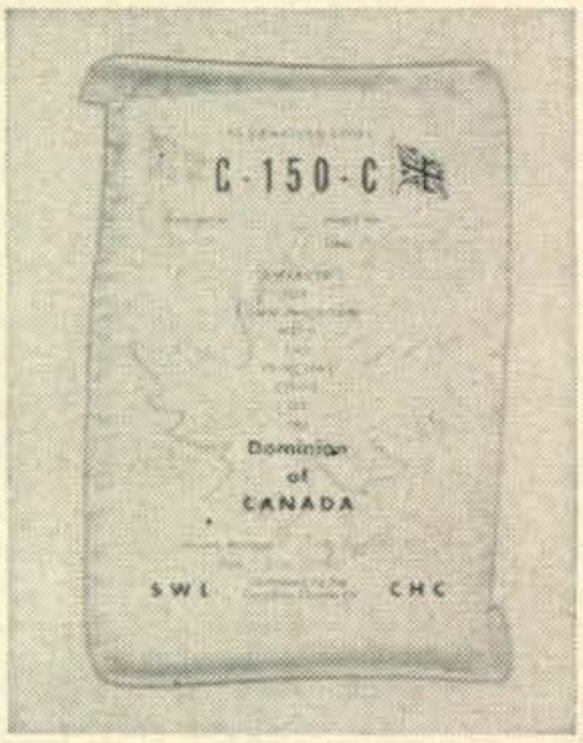
Who among you with 20-20 vision can match Frank's sightless contributions to the art and science of communications and amateur radio? Who else is better qualified to sparkplug the White Stick Amateur Radio Club which has purpose of giving publicity to the many contributions blind hams make to amateur radio and how they can and do help provide many hamdom services. Let's all get behind Frank in making the WSARC a monumental and living instrument of man's accomplishments under difficult circumstances . . . let's help Frank, a ham since 1928 (age 9) show the way along a brilliantly lighted path. Yes, Frank's XYL also is blind. See picture of Frank at his rig. P.S. A letter from Frank today, he is having difficulty getting award certificates printed up in Northern Ireland . . . who is willing to help Frank over this hurdle?

YL International SSB'ers Awards Program

The SSB'ers, with membership nearing 1500 in over 200 countries have launched a major awards program for working members with emphasis on working DX. All contacts after February 9, 1963, the date the SSB'ers were founded. There are no band/mode endorsements. For all awards, send fees as specified. Complete member list will be kept updated in the *Directory of Certificates and Awards.* Awards are as follows: (Note: No charges to DX stations as a good will action)

KING NEPTUNE AWARD (KNA)

U.S. stations work 10 DX members plus 5 in the U.S.; DX stations work 10 members in U.S. plus 5 DX; total 15. Up to 15 seal endorsements to basic award for working additional



Here is the C-150-C Award sponsored by the Canadian SWL-CHC Chapter 1 for working cities of Canada. North Americans work 50 for basic award and with seals for each additional 25; other work 30, with seals for each additional 30 thereafter. Each a separate award. No Province restrictions for basic award but all 10 must be included for each seal after the first one. Available to s.w.l.s. Send GCR list and $1 or 10 IRC to Custodian, Andy Rugg, 16 Lakebreese, Pointe Claire, Quebec, Canada. Endorsement seals for all one band/mode or mixed for one IRC or 10¢. (U.S. s.a.s.e. are not good in Canada). Send one IRC or 10¢ for awards rules and application blank which lists all Canadian cities.

Pictured here is noted DXer, IT1AGA, Giuseppe de Luca who has just won the coveted CHC-200 Top Honors Award for holding over 200 amateur radio awards certificates. Gius is in line for the Arne Trossman Top Honors Plaque. Hamdom's congratulations to Gius, a ham's ham.

members in steps 5/5 (total 10). After one has achieved basic award with 15 seals (165 contacts) a new series may be started for different stations. DX stations is no charge. Members is 50¢. Others $1 or 10 IRC. S.a.s.e. only for seals. Available to s.w.l.s. Send GCR list to Custodian, K4ICA, 428 S.W. 28th Road, Miami 36, Fla.

BELT OF ORION AWARD (BOOA)

For working 50 members who are holders of the King Neptune Award completed with all 15 seals. *Not* available to s.w.l.s. Fees as above. Send GCR list as above.

VENUS TROPHY

For working 100 members who are holders of the belt of Orion Award. Not available to s.w.l.s. No charge. Send GCR as above.

NORTH STAR SERIES AWARDS (Seven available)

Continent: For working members in all six continents.

U.S.A.: For working members in all 50 States.

International: For working members in different countries; Class E is 25; Class D is 50; Class C is 100; Class B is 200; Class A is 300. Fees same as for KNA. Available to s.w.l.s. Send GCR list as above.

KING NEPTUNE TROPHY

For working 500 members. No charge. GCR. Not for s.w.l.s.

PEGASUS TROPHY

For working 1000 members. No charge. GCR. Not for s.w.l.s.

Membership in the SSB'ers is by invitation.

Here is the Cook County (Illinois) Award sponsored by the Illinois Certificate Hunters' Club, Chapter 17 for working CHCers in various cities of Illinois. The list of 72 cities and awards conditions are too lengthy to repeat here but full details may be obtained from the Custodian, Cliff Corne, K9EAB, 711 West McClure Ave., Peoria, Ill. Self-addressed stamped envelope please.

Full membership is in three categories; 1. U.S. citizens who pay dues; 2. Non U.S. citizens who are sponsored by U.S. citizens, and who pay no dues, and 3. Honorary members who pay no dues.

The SSB'ers with members all over the world and on many DXpeditions, hold regular world-wide nets at 1800 GMT, 14333 kc each Tuesday and Thursday. On the 4th Thursday each month the net is open to all stateside OMs. (NOTE: same general group also hold net, same time/freq. as CHC international SSB net which is open to all hunters each Wednesday.)

The SSB'ers have announced annual QSO Party to be held concurrently with annual CHC QSO Party the first week-end of June for the purpose of (like CHC) supporting all awards programs and hunters. SSB'ers normal QSO Party frequencies, and general hang-out frequencies are: 3805, 3995, 7205, 7295, 14333, 21410, 28440 and 50210. Main calling frequency and net frequency is 14333.

What's Cooking Department

What's cooking could fill the whole rag; however, that N.Y. editor keeps telling me *CQ* is limited for other hobby interests too, so, it's up to you readers to tell him if he is wrong. We are already running out of awards matter space, so we'd better chop this short . . . see you next month.

Old Man K6BX

You'd never know by Frank's (G16TK) smile that he is sightless . . . fact is, to hear Frank on the bands working DX, you'd marvel at his adeptness in twirling the dials. Frank is highly active and can be found daily on 14333. See Text for story of Frank spark-plugging sponsorship of the White Stick Award.

YL

LOUISA B. SANDO*, W5RZJ

CONGRATULATIONS to Anny Jenk, HB9YL, first licensed YL in Switzerland, who recently received CHC award No. 888 in a surprise presentation by Mayor Ramu of Frutigen. Anny's OM Fred, HB9TT, secretly compiled the list of her awards and applied to K6BX for CHC. She knew she had a lot, but was always too QRL to follow up with them, or QSLs, so HB9TT is award manager for both.

Fred, who works for PTT Telefonservices, went on the air in '55. QSLs and letters got Anny interested and in '57 Fred applied for her s.w.l. license. In the spring of '58 she passed the code exam and that fall the technical one. Since then they have enjoyed numerous QSOs together. Their QTH, in a valley of the Berner Oberland Mtns., is not too good for hamming and the Americas represent rare DX for them! Most W-K QSOs have occurred while they camped out on holidays usng a 7-watt rig and dipole, or during national field day with their club (at Thun) as HB1TT-HB1YL. The Jenks run 50 watts and for the past year have been using a cubical quad. Anny has worked 160 countries, 150 confirmed; HB9TT has 208/200.

Anny and Fred have two jr. YLs, Elizabeth 14 and Margrith 12. Anny's second hobby is gymnastics and she is 2nd leader of a women's gymnastic club, the leader of which is YF of the mayor. (Quite a conspiracy there between Fred, Clif and the Ramus!)

Fred adds there are currently two other YL stations in Swtzerland: HB9YY, Anneli, YF of HB9YR, and HB9ACO, YF of HB9QV.

IHHC

In the April column we had a pix of W7QYA and SM4KM, taken while Flo was on a world trip with another teacher from Lewiston, Mont. Since then Flo has returned home, and along

[*Continued on page 102*]

*4417 Eleventh St. N.W., Albuquerque, New Mexico

Flo Majerus, W7QYA, enjoyed many ham contacts through IHHC during her world trip. Flo was first licensed in 1950 when working for CAA in Alaska. She works 20, 40, 80 mostly c.w., though can work s.s.b. and a.m., and especially enjoys DX. She uses a Thunderbolt kw to 3-element beam on 20, dipoles on 40 & 80. Her OM is W7VMB, Mel.

On her world trip Flo, W7QYA, visited the ZL YLs in Auckland and forwarded this photo of some of them taken during the New Zealand Field Day, which takes place in February. L. to r., ZL1AMK, Eleanor Jensen; ZL1LD, Pat Joseph; YF of ZL1AFQ, Enid Rosan, and ZL1ANA, Janette Barker.

Anny Jenk, HB9YL, receives CHC certificate No. 888 from Mayor Charles Ramu at Frutigen, Switzerland. In the right photo, Anny and her family, Elizabeth, OM Fred, HB9YT, and Margrith.

HAM CLINIC

CHARLES J. SCHAUERS*, W4VZO

WHEN the klystron tube was invented, it opened up a large area for practical communications in the microwave spectrum. However, because of its high price, few amateurs used the tube in their u.h.f. work. Although it is still expensive, the price is within reach of most hams who are seriously interested in using the u.h.f. spectrum allocated for amateur radio operation.

As we know, the speed of the electrons emitted by a cathode in a vacuum tube is very high. However, at microwave frequencies, the time it takes an electron to travel between the cathode and plate of a vacuum tube may be quite long when compared to the frequency of a signal. Long before an electron can make its way to the plate, the field between the cathode and plate (at microwave frequencies) may reverse itself. The result is a phase reversal between plate voltage and current, increased plate dissipation, lower output power and frequency limitations.

In the klystron however, the drawbacks found in using vacuum tubes at microwave frequencies are obviated. In fact, the transit time is an important function in the klystron and is used to generate and/or amplify radio frequencies in the microwave region.

How It Works

An electron stream always flows toward a positive point. A negative field will repel an electron while a positive electric field will attract it. However, as the electron moves away from a positive force, it will be slowed down. On the other hand, when it flows away from a negative field it is accelerated.

An increase of electron velocity increases the Kinetic (caused by motion) energy of the electron, and a decrease of velocity decreases its Kinetic energy.

*c/o *CQ*, 300 W. 43 St., New York 36, N. Y.

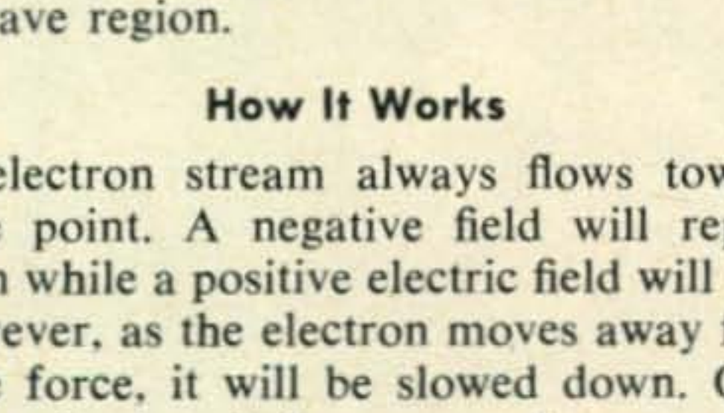


Fig. 1—Simplified Klystron amplifier. Focusing electrodes are not shown for simplicity.

When energy is added to a flowing electron or taken away from it, the energy must come from somewhere or be dissipated. This addition or subtraction of energy is due the action of the electric field.

To understand how the klystron operates, refer to fig. 1. Here you see at opposite ends of the tube a cathode (left) and an anode or collector (right). Next to the cathode is the positive accelerator grid (G_1) which pulls the emitted electrons from the cathode and directs them in a very high-velocity stream toward the two grids in a cavity resonator. These grids (G_2 & G_3), called buncher grids, have an electric field between them which is due to the signal voltage fed into the cavity by a probe, coupling loop, or a waveguide. The cavity has both inductance and capacitance so acts like a tuned *L-C* circuit.

On positive half cycles, the field between the buncher grids speeds up the electrons. As the signal wave approaches its zero position, the electric field has less and less effect on the electrons, until zero is reached and there is no effect at all. On negative half cycles, the field slows the electron stream.

The electron stream then leaving the buncher grids is composed of electrons going at different speeds. In the drift space (between G_3 and G_4) there are no fields which could accelerate the electrons. The electron speed will be the speed at which each electron left the buncher grids. The electrons traveling at a faster rate than others will overtake the slower electrons and at a given point in the drift space, the electrons will form bunches due to their "jamming up."

The second resonant cavity near the end of the tube contains catcher grids (G_4 and G_5). Its position is at the point where the electron bunches form.

An r.f. voltage (at the cavity resonant frequency) is induced by the electron bunches in the catcher cavity, the action of which is analogous to a tuned *L-C* circuit. When the proper phase relationship exists between the induced r.f. voltage and the bunches, field action will slow down the electrons as they pass the catcher entry. Energy from the slowed electrons goes into the catcher cavity field and is removed by another coupling loop. The deaccelerated electrons continue on until they strike the collector which conducts them back to the cathode.

There is no *net* exchange of energy in the buncher cavity throughout a complete cycle of signal voltage because the electrons pass the buncher gap in a constant stream and the signal voltage has an equal positive and negative effect on the electron stream, *i.e.*, it slows down as many as it speeds up.

Amplification action of the klystron is due to the energy given by the slow electrons to the catcher field. This represents an increase in power which is greater than the applied signal voltage.

To obtain power outputs in the kilowatt power region, multi-cavity klystrons are available. These are made with two cavities and achieve much greater efficiency by cascading power gains.

For use as an oscillator at u.h.f. and s.h.f., the klystron operates by feedback action. That is, output from the catcher cavity is fed back to the buncher cavity in the proper phase, as in most tube oscillators, where there is plate to grid feedback.

For frequency multiplication the buncher cavity is made larger than the catcher cavity. The catcher cavity is then tuned to resonance at some multiple of the buncher cavity frequency.

Reflex Klystron

The reflex klystron is shown in fig. 2. Note that only the resonant cavity and one set of grids are used. These grids act as both buncher and catcher for the electrons emitted from the cathode.

The two cavity klystron uses a collector, but the reflex klystron uses a repeller electrode instead. The electrode is negative with respect to the cathode and deflects the electrons back, rather than returning them to the external circuit.

Frequency and power output of the klystron are dependent on the time it takes the electrons to leave the gap and return in a bunch. The time in turn depends on the distance between gap and repeller and the supply voltage on the grids and repeller. A tube having a fixed distance between gap and repeller enables the control of frequency and power output by the repeller voltage.

The r.f. output of a reflex klystron may be taken through waveguide or coaxial cable.

The overall efficiency of a reflex klystron is very small, but this is no hinderance in most applications.

To modulate the circuit of fig. 2, the modulating signal can be connected in series with the repeller voltage supply, similar to plate modulation of a vacuum tube.

We hope that this will answer the requests to "simplify the explanation as to how klystrons work."

Questions

Doublet Transmission Line—"I managed to get hold of some 'new' surplus W-110 field wire (twisted pair) used by the military forces. I plan to use some of it for a doublet antenna transmission line. Will it work okay?"

No. This wire is composed of steel and copper strands and does *not* have an impedance of 72 ohms or 300 ohms. With coaxial cable cheap as it is, use the 72 ohm type for the simple doublet, and 300 ohm flat line for the folded doublet.

Overload 6146—"The 6146 in my small transmitter only lasts about two months then out it goes. I am using about 4½ ma of grid drive, about 300 volts on the screen and 800 volts on the plate in a class C final. What gives?"

Under the conditions you describe, the tube, of course. Gosh, you've been overloading it, no wonder frequent replacement is necessary. Keep your grid drive down to 3 ma, plate voltage at 750 volts, screen voltage at 160 volts for c.w. For phone, 600 volts on the plate and about 160-175 volts on the screen.

S.S.B. Exciter Power—"What is an easy way to check the power output of a simple s.s.b. exciter?"

Connect the exciter to a dummy load (matching its output impedance). Across the load connect a vacuum tube voltmeter. Use the formula $E^2/R = P$. Your v.t.v.m. will read r.m.s. volts. It is assumed that you will apply tone modulation to the exciter. Your calculation will be average power, if you use an r.m.s. calibrated v.t.v.m.

KWM-2 Modification—"Do you have any information on modifying the KWM-2 transceiver so that I can shift my receiver frequency some distance away from my transmitting frequency without major 'butchering'?"

No. If anyone has such information we would be glad to publish it here. How about it anyone?

Converter for Transistor Radio—"I have been trying to make a 10 meter transistorized converter work with my BC transistor radio. However, I am stumped. I continue to receive BC signals after the converter is connected to the BC set's antenna coil. Any solution?"

If you don't shield the antenna coil you will continue to get BC pickup. Shield the coil and connect it via a coaxial cable to the output of your converter by placing a .001 mf capacitor in series with the cable's center lead. Ground the coax shield to the BC set chassis.

Predictions—"A few years ago you predicted that the Collins KWM-1 would be followed by *other transceivers*—seems you were correct. Got any other predictions hanging around?"

In 1967, 10 meter DX will be blooming; transceivers will be *completely* transistorized and be available in 500 watt units; there will be more hams than CB operators; hams will

[*Continued on page 96*]

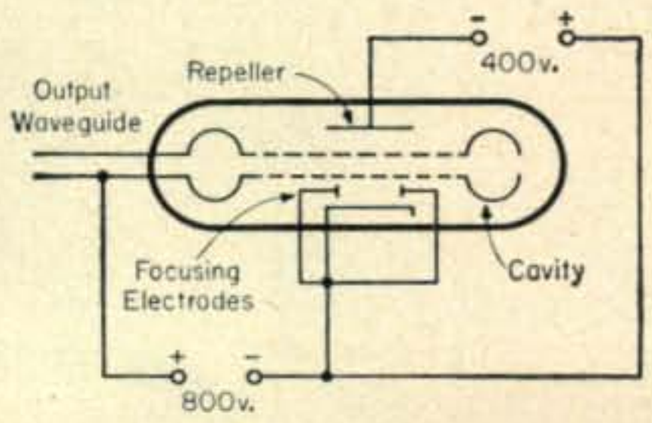


Fig. 2—Reflex Klystron oscillator circuit. Only one cavity is necessary to achieve oscillation.

RTTY

BYRON H. KRETZMAN*, W2JTP

RTTY Operating Frequencies

Nets centered on frequencies given; operation usually ± 10 kc on h.f.

80 meters	3620 kc
40 meters	7040 kc
20 meters	14,090 kc
15 meters	21,090 kc
6 meters	52.60 mc
2 meters	146.70 mc

AMATEUR radioteletypers have been permitted to use narrow shift, that is, less than the previously authorized 850 cycles, since March 16, 1956. While most general RTTY operation is on 850 cycle shift, much experimentation with narrow shift has been going on, both on the air and on the bench, ever since. The advantages of n.f.s.k. (narrow frequency shift keying) are: less spectrum required, therefore less QRM; less receiver bandwidth required, therefore better signal-to-noise ratios are realized; less trouble from selective fading, therefore fewer resultant errors. What we are trying to say is that more reliable scheduled traffic circuits are possible when n.f.s.k. is utilized.

*431 Woodbury Road, Huntington, N. Y.

RTTY The Hard Way...No. 23

"I'm still not convinced those new gears are for 60 w.p.m."

The disadvantages of narrow shift are essentially technical. Let's face it: it isn't as easy to handle as 850 cycle shift. This, of course, doesn't daunt the serious RTTYer. Sure, it takes a little more effort, but this is the sort of thing that keeps amateur radio alive. Speaking now of h.f. operation, stability *is* a problem. A really stable receiver is required, and careful attention to the v.f.o. and its f.s.k. circuit is required. The receiving converter (TU) must be specially built to achieve completely satisfactory operation; that is, unless you have available the surplus CV-89 of the AN/URA-8A. (RTTY Column, *CQ*, June '62) The i.f. converters of the AN/URA-6 and -7 also have narrow shift built in. (RTTY Column, *CQ*, Sept. '62) A positive tuning indicator also is a vital necessity. Even the experts can't properly tune in n.f.s.k. by ear.

A few brief words are in order here on standards for narrow shift. The surplus converters are designed to operate with shifts of 200 cycles or less. Amateur RTTY has more or less standardized on 170 cycles, a commercial standard for tone telegraph. The actual value we use is not too important since most TU's for narrow shift are not of the tuned filter type but are of the discriminator type which will accept a reasonably wide range of shift, say 60 to 300 cycles. When an audio-type of TU is designed, the question arises, "What should the center frequency be?" The CV-89 uses 1000 cycles. Should we design around this or some other, perhaps more convenient, value?

The Narrow Shift of W2JAV

A most fascinating demonstration of the latest in narrow shift equipment and techniques was given by Phil Catona, W2JAV, at the March 25th RTTY Meeting in New York. Most of you are acquainted with the simple transistorized 850 cycle shift equipment Phil developed to assist the newcomer in getting started. (RTTY Column, *CQ* Feb., Mar., Apr., May '62) Well, Phil's narrow shift gear was designed in the same format. A printed circuit card contains the TU and another card the a.f.s.k. oscillator. The same connections are used, so changing from standard 850 cycle shift to narrow shift is simply a matter of switching around the printed circuit boards. Like the wide-shift gear, a polar relay in the output of the narrow shift TU is used to key the local

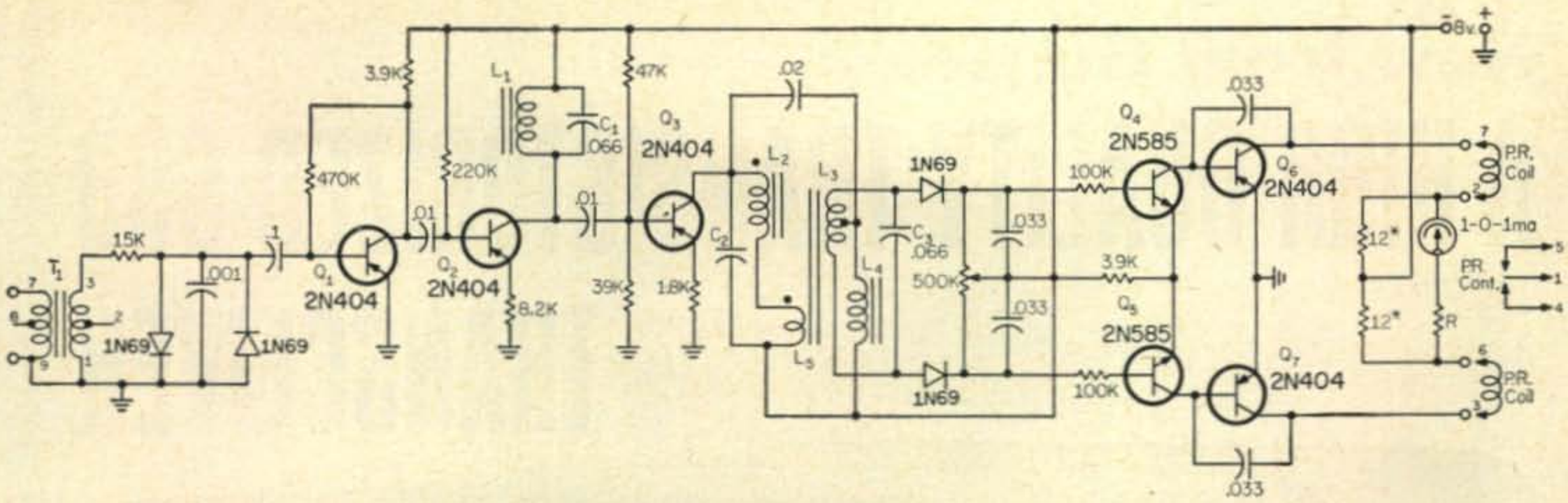


Fig. 1—Schematic diagram of the W2JAV narrow shift TU. Resistor *R* should be adjusted so the 1-0-1 ma meter reads ¾ scale at 40 ma. Nominal meter resistance is 1000 ohms. All capacitors are in mf; all resistors are ½ watt. Resistors marked (*) are matched pair. C_2, (.066) should be adjusted to resonate L_2/L_5 at 2125 kc.

loop. Again, as with the wide-shift TU, if you are scared of polar relays, you can use the solid state loop keyer Phil developed (RTTY Column, *CQ* Nov. '62).

Standards decided upon by W2JAV in the design of this narrow shift equipment were: 170 cycle shift and a center frequency of 2125 cycles. This makes *mark* 2040 cycles and *space* 2210 cycles. Although the TU was designed around 170 cycle shift, it was thought most desirable that the TU be capable of copying shifts from 300 cycles down to the minimum practical value for our 45.45 band speed of transmission (*The New RTTY Handbook*, pages 24 and 25). The 170 cycles was selected mainly because it is a standard commercial value. The 2125 cycle center frequency was selected not only because it too is a commercial value and because filters are available in some surplus, but because it is a convenient amateur standard, the *mark* tone for 850 cycle shift. The well equipped RTTYer already has test equipment on this frequency, which is real handy.

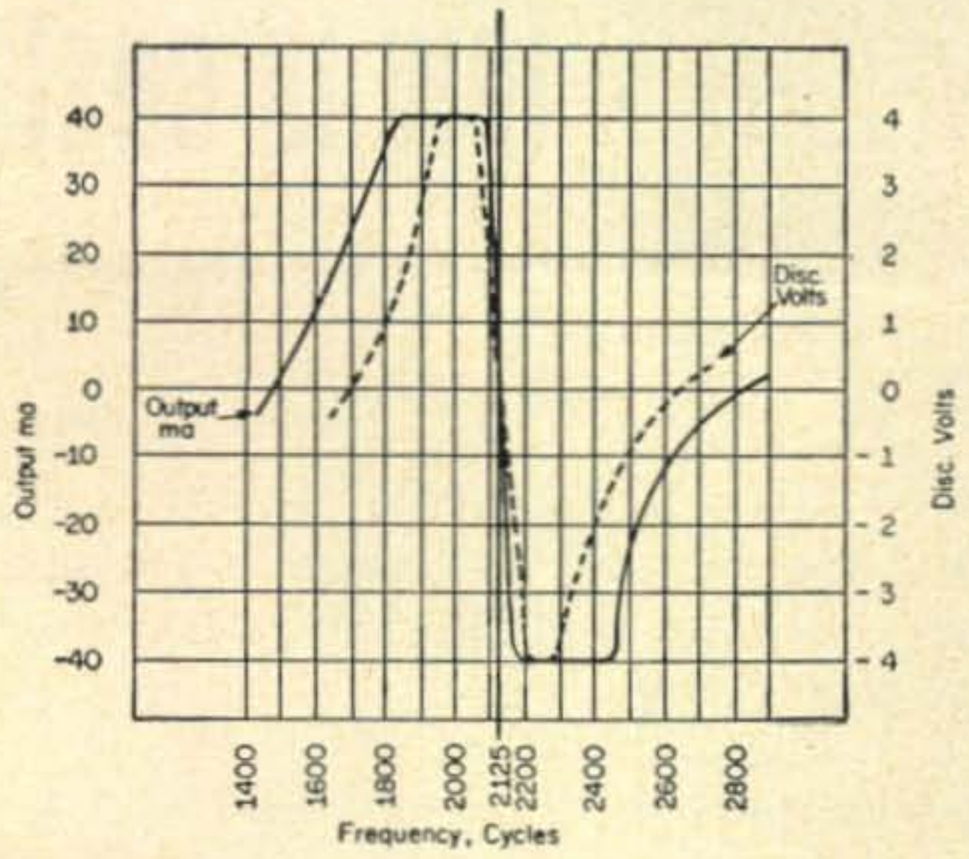
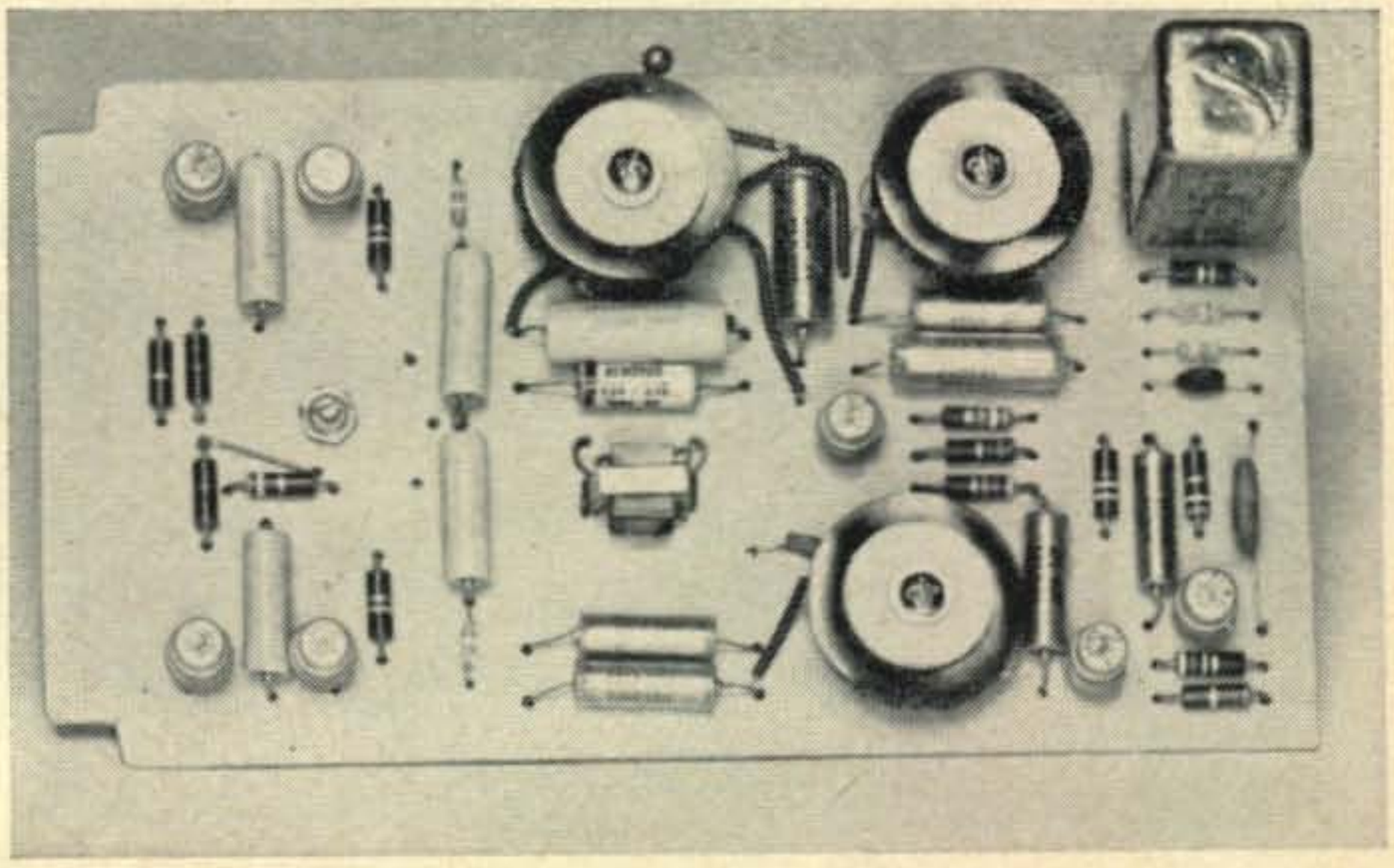


Fig. 2—Response curve of the W2JAV narrow shift terminal unit.

A Transistorized TU for Narrow Shift

Figure 1 is the schematic diagram of the W2JAV narrow shift converter. The accompanying photo shows that construction is very similar to that of Phil's wide shift TU. All the coils in the *L-C* circuits are the usual 88 mh telephone loading coils. L_3, though, has 60 turns of #28 or #30 enamelled wire wound over it for the coupling coil L_5. (The black dot denotes start of a winding). The primary of a miniature Lafayette TR-97 or TR-120 transformer serves as the high inductance (over 3 h.) required as the a.f. choke L_4 in the discriminator circuit. The "W2EWL SSB" transformer, same as used in the wide band TU, is still available from several sources, including Arrow Electronics of Mineola, N.Y. The 22K winding, not used, is not shown on the schematic. All the other components, including the transistors, are straightforward and inexpensive.

[*Continued on page 100*]



W2JAV narrow shift terminal unit.

New from Gonset

A HIGH QUALITY TRANSISTORIZED SSB TRANSCEIVER

that is

ULTRA-COMPACT • LIGHT WEIGHT • low in cost

Gonset has scored a breakthrough with the new "Sidewinder"—a 2 meter SSB, AM and CW transceiver that combines technical excellence with contemporary design and compact, sturdy construction.

The Gonset "Sidewinder" provides coverage of the entire 2 meter band in four segments 1 Mc wide. It has built-in VFO and the receiver is *completely* transistorized. There are a total of 21 transistors, 6 diodes and three tubes in the "Sidewinder," which operates on either SSB, AM or CW.

The power supply is designed for snap-on back or remote installation and is available either as a kit or a wired and tested unit.

CHECK THESE DELUXE FEATURES AT YOUR LOCAL DISTRIBUTOR!

• Receiver and transmitter utilize dual conversion. • Designed for mobile and fixed station operation. • Illuminated dial and "S" meter. • High voltage power supply is used only in transmit mode. • Highly Stabilized VFO. • Crystal lattice filter for both receiver and transmitter. • 20 watts PEP input SSB, 6 watts input AM, 20 watts input CW.

Transceiver: 8¾" wide, 4¾" high, 7" deep. Weight: 7 lbs.-10 oz. Amateur net price **$349.95**

Power supply: 8¾" wide, 4¾" high, 5½" deep. Weight: 11 lbs.-2 oz. Amateur net price—kit **$39.95** Wired and tested unit **$49.95**

The new Gonset "Sidewinder" SSB Transceiver will be on display at your local distributor's in August.

GONSET INC.
A SUBSIDIARY OF ALTEC LANSING
801 SOUTH MAIN STREET, BURBANK, CALIFORNIA

For further information, check number 6, on page 110

VHF AMATEUR

Vol. 5, No. 9—Sept., 1963

BOB BROWN, K2ZSQ, Editor

In This Issue

Departments

VHF Sideband Column.... 76
DX Report Column..... 77
UHF Roundup Column.... 78
Syracuse Roundup..... 73

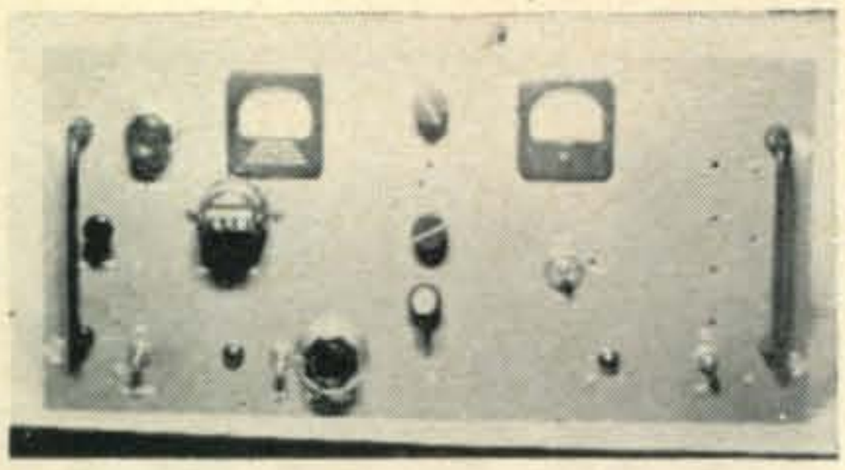
Features

Two Meter Kilowatt *Bob Heil, K9EID, and Gus Budina, K9EBA* 72

The VHF Amateur Reviews: The Clegg Thor 6 Transceiver *Bob Brown, K2ZSQ* 74

Cover Photo: Meet Les Watkins, WØWEQ, at the controls of his VHF sideband installation in Normandy, Missouri.

Address all correspondence to: Bob Brown, K2ZSQ, Editor, *The VHF Amateur*, 300 W. 43rd St., New York, N.Y. 10036



An effective 144 mc class AB1 linear amplifier using 4X-250B's running 500 watts on a.m. phone and a full 1000 watts p.e.p. on s.s.b!

Two Meter Kilowatt!

BOB HEIL, K9EID*
402 Border Street
Marissa, Illinois

GUS BUDINA, K9EBA
305 North Cedar
O'Fallon, Illinois

PAGING THROUGH THE LAST ten year's many amateur publications, I find that construction articles using 4X250B's are hard to come by, especially a good circuit for use on VHF. This was the basis for the kw amplifier at K9EBA. Gus had many headaches during the birth of this final amplifier, but after many hours of sketching and building, it was finished and today is working perfectly. This final would not be for the rank novice starting on his first building project, but rather is meant for the serious-minded VHF man who has intentions of using it on sideband. Note to *a*ncient *m*odulation men: This final also performs well on a.m.

The power supply and r.f. components are contained all in the same cabinet with all controls brought out to the front panel. The plate, screen, and grid of the 4X250B's are metered with a 0-750 ma. meter in the plate, and a 20 ma. meter being switched between the control grid and the screen grid. The tuned lines can be adjusted for length; the loading capacitor, plate capacitor, and grid variable are all tunable from the panel. The bias control is also accessable. Various switching for the filaments, high voltage, low voltage, etc., is also controlled from the front panel.

The plate tank and tube compartment was made from a 7 × 15 × 6" aluminum box. To the base of this was added two 7 × 7 × 2" aluminum chassis bolted on the bottom to form the grid compartment and a box for some of the power supply components. The grid compartment must have a bottom plate fastened to it, so it becomes a pressurized section onto which a blower of sufficient square-foot-per-minute can be mounted to keep the tubes cool.

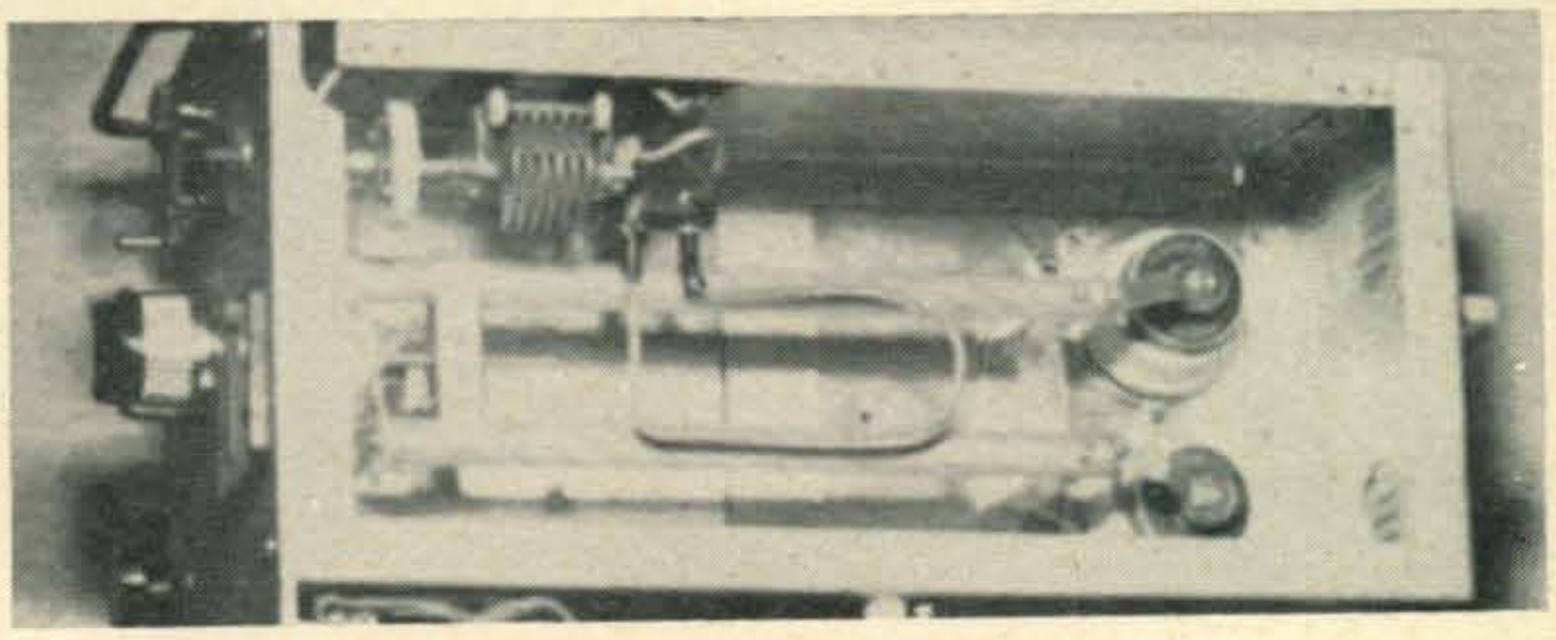
*VHF Sideband Editor, *The VHF Amateur*.

The two tube sockets for the 4X250B's are mounted on one of the small 7 × 7 × 2" chassis spaced ⅜" apart arranged to clear the back of the plate line box. The plate tank is constructed by using two pieces of ½" copper water pipe 11" long. The shorting bar is formed by a ¾" bronze rod with two sides filed flat to conform with the diameter of the ½" copper plate lines. By using some silver nitrate powder, the builder can silver plate all of the copper parts in the tank circuit. The copper parts must be thoroughly cleaned and brightened by hard rubbing with steel wool. The silver nitrate powder is then rubbed onto the part to be silver plated. This silver nitrate is used by electrical firms to silver plate buss bars before silver soldering and is available under the trade name, *Kool Amp*.

The grid circuit is made from #14 wire bent into the proper shape as illustrated. The grid coil L_2 is mounted right to the grid pins of the tube sockets. C_1 is mounted on the front of the compartment and controlled from the front panel by a 5" length of ¼" rod connected to the shaft of C_1. The grid link L_1 is connected to the coax fitting on the back panel, routed over the top of L_2 and grounded to the chassis at a point in the center of the two tube sockets.

Neutralization of the amplifier is very easy by using some of the non-capacitance feed-thru insulators beside each tube socket and attaching the crossed grid leads to the bottom side of the feed-thru. On the top side of the chassis, a one inch length of #18 en. wire can be attached to the feed-thru. By moving these leads closer and further apart from the 4X250B's, proper neutralization of the amplifier is obtained.

Check all of the tuned circuits with a good grid dip meter to assure that all the coils and



Top view of the linear amplifier showing the 4X250B's at the right connected by ¾" copper straps to the 11" copper tuned lines. Shorting bar at the left is threaded and adjustable. Top plate (removed for photograph) is well ventilated.

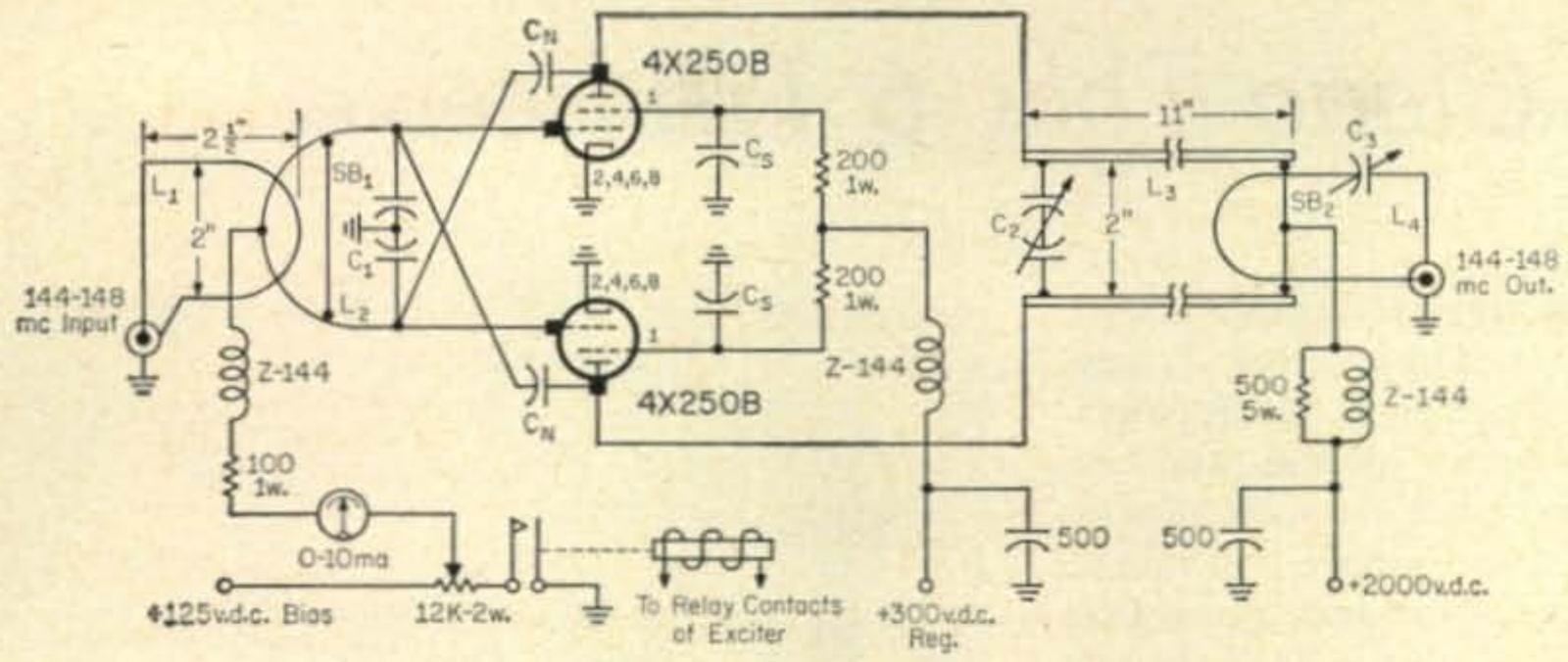


Fig. 1 — Schematic diagram of the described push-pull 1000 watt class AB_1 linear amplifier for 144 mc. This straight-forward linear can be excited with 10 to 15 watts of c.w., a.m., or s.s.b.

$C_{1,2}$—Split-stator single rotor (single stator each side with approximately .2" gap).
C_3—15 mmf, double spaced variable capacitor.
C_n—Crossed 1" grid leads constructed of #18 e. through chassis near far side of each tube. See text for neutralization info.
C_s—Part of 4X250B tube socket.
L_1—2½" long hairpin loop of #14 spaced ⅝ to ¾" from L_2 and rigidly fastened.
L_2—4" hairpin loop of #14, 1½" wide.
L_3—Tuned lines constructed of two 11" sections of ½" copper tubing spaced 2" apart, shorted with variable shorting bar as detailed in fig. 2.
SB_1—Piece of #14 copper wire used as shorting bar across L_2 so that C_1, half meshed, will tune tank to approximately 146 mc.
SB_2—Adjustable threaded shorting bar for L_3. See plate tank detail, fig. 2.

tuned lines are on the proper frequency and can all be tuned with adjustment of the correct capacitors in each circuit. After frequency is obtained and the amplifier is ready to fire, the first thing to check is to make sure the blower and the filaments are coming on at the same time. *Never operate the filaments without the blower running!*

Neutralization is to be accomplished next. By using the r.f. probe in the v.t.v.m., connect the probe to the center conductor of the coaxial output connector and ground the shield. With drive from the exciter applied, *B-plus off*, adjust the two stubs of #18 enameled wire along side of each tube for minimum reading on the v.t.v.m. B-plus and bias can now be applied and adjust the voltages to these values: plate voltage, 2000 v.d.c.; screen grid voltage, 300 v.d.c.; control grid voltage adjusted so that the plate current draws 200 ma. with no drive applied; heater voltage, 6 v.a.c., 2.1 amp.

Apply drive from the exciter again and load the amplifier to the antenna system. You should now be able to load the plate to 400 ma. with no trouble with proper adjustment of the grid tank and plate lines. At this point the input will be 800 watts with a steady carrier (this will be more or less depending on the antenna system and the efficiency of the plate lines). One thing to remember about an amplifier of this type is that most of the problems encountered with parasitic oscillations and unstable operation are usually developed with excessive grid current (control grid and screen grid) which become very harmful to the tubes under prolonged operation.

Plate loading should be fairly heavy with a point of good output obtained while maintaining a minimum of screen current. The lower voltage and higher current is much more effective than low current and higher voltage. The screen dissipation is 12 watts per tube and this is one point that should be observed very closely. If the screen dissipation rating is exceeded, the tubes will be very short-lived and will die a horrible death.

By following the diagrams and photographs closely, one should be able to construct this final for two meters with a minimum of trouble; operation of it will become a terrific pleasure as soon as you get it on the air. The authors will be only too happy to answer any correspondence concerning this rig. *See you on two!* ■

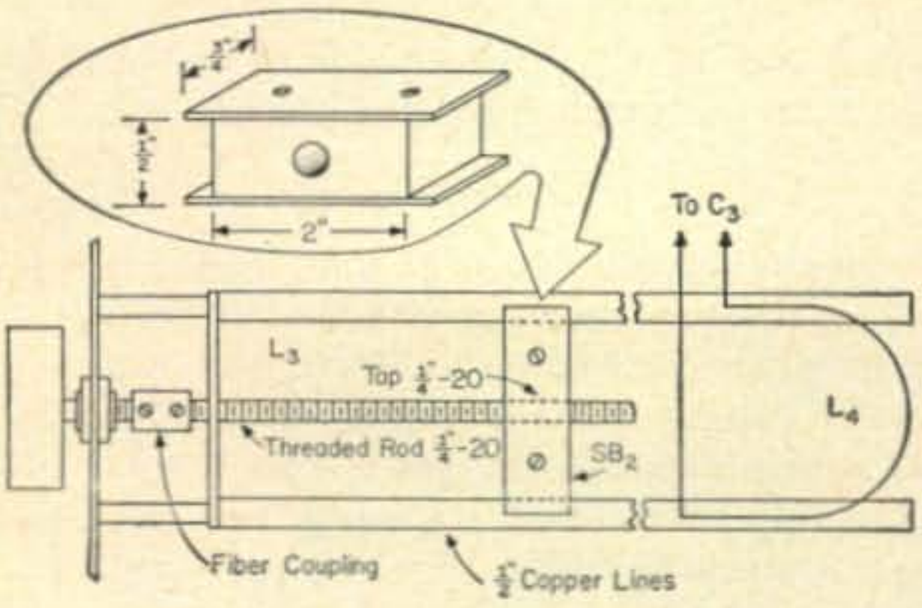


Fig. 2—Diagram of the tuned lines in the tank circuit of the 1000 watt linear amplifier for 144 mc. Note construction of the shorting bar, SB_2. Length of tuned lines is 11 inches.

SYRACUSE VHF ROUNDUP!

Register at noon Oct. 12th for the 9th Annual **SYRACUSE VHF ROUNDUP** to be held at the Three Rivers Inn on Route 57—only 10 miles north of Syracuse, N. Y. Guest speakers: Sam Harris W1FZJ, John Zimmer W2BVU, and Bob Guba W1QMN. Obtain tickets from: **Joe Zippi K2BYU, 405 Edgerton, Minoa, N.Y. OL 6-9144.**

The VHF Amateur Reviews:

The Clegg Thor 6 Transceiver

BOB BROWN, K2ZSQ*

LONGTIME A PIONEER in VHF innovations, Clegg Laboratories of Mt. Tabor, New Jersey, recently introduced the Thor 6, a 50 mc transceiver featuring 60 watts input on a.m. and c.w. with v.f.o. control. This unit consists of two packages; one, the a.c. power supply and modulator and the other, the receiver and transmitter r.f. unit. Combining many of the well known characteristics of its predecessors, the Clegg Interceptor and Zeus, the Thor 6 comes very close to providing the ultimate in medium power VHF transceiving.

As can be seen in the accompanying block diagram, two methods of establishing transmitter frequency are provided. Crystal control is achieved through a conventional crystal oscillator with harmonic amplification, wherein one half of the 6U8 functions as the xtal osc./ harmonic generator with 25 mc output. Design is such that crystals may be either of the 8.33 or 12.525 mc variety, with 6U8 output at 25 mc regardless. The 12BA7 functions as a frequency doubler to 50 mc. V.f.o. operation is by heterodyne generation in the 12BA7 wherein the output of a 10.7 mc crystal oscillator, one half of the 6U8, is mixed with the output of the 39.3—41.3 mc v.f.o. The sum of these two frequencies is selected in the 12BA7 plate circuit and will automatically coincide with the 50-52 mc frequency to which the receiver is tuned.

The 6DJ8 first 50 mc amplifier is in a conventional cascode circuit and drives the 7558 as a Class C 50 mc second amplifier. The 6883 is a conventional Class C amplifier with modulation of both screen and plate voltage. Normal plate input is approximately 62 watts. A well designed pi-network tank circuit furnishes output efficiency in the order of 65-70%. A 12AT7 serves to amplify the microphone output to adequate voltage and power level for the input stage of the modulator. Audio gain is adjustable at the rear of the r.f. chassis.

For receiving, signals are amplified in the grounded grid 6CW4 r.f. stage; three tuned circuits are employed here to provide essentially flat response over the 50-52 mc range. The tunable oscillator and cathode follower, 6DJ8, tunes between 39.3 and 41.3 mc. This beats with the signal in the 6EH7, first mixer, for 10.7 mc output. A selective crystal lattice filter is used in the mixer plate circuit for maximum selectivity. The 6BL8 performs two functions: a pentode second mixer, and an 11.156 mc crystal oscillator which converts the 10.7 mc filter to 455 kc. Two transformers with associated capacitors produce a filter arrangement to supplement the selectivity of the 10.7 mc crystal filter.

*Editor, *The VHF Amateur*, 300 W. 43rd St., New York, N. Y. 10036.

View of the receiver and r.f. unit. Controls are (left to right) BFO INJECTION, crystal socket, receiver-v.f.o. tuning dial (above), VFO-XTAL switch, SEND-RECEIVE-ANL, and (top to bottom, far right) final plate tuning, antenna loading and ON-OFF-VOLUME. The Thor 6 50 mc transceiver runs 60 watts input and is v.f.o. controlled. Not shown in photo is the modulator and power supply unit, located remote and connected by a 10 foot cable.

The 6EH7 functions as a conventional 455 kc i.f. amplifier with sufficient gain to assure linear operation of the detector circuit. An a.v.c. control is applied to the 6EH7 i.f. as well as the 6CW4 r.f. stage. A 12AL5 is used as both detector and a.v.c. rectifier. A 1N645 silicon diode serves as self-adjusting series peak noise limiter, which is controllable from the front panel TRANSMIT-RECEIVE switch by simply injecting ANL. The two sections of the 6BM8 furnish more than 1½ watts of audio output, better than necessary to drive headphones or a speaker. The calibrated S meter indicates changes in the plate current of the a.v.c. stages. It might be added that this meter is much more reliable in giving out signal reports than most used today.

Selectivity specifications read 5 kc at 6 db down and 12 kc at 50 db down, something just short of the Interceptor for sharpness.

Performance

On the air operation of the Clegg Thor 6 is a real pleasure. Once the 10 foot connecting cable is in place between the units, the modulator/ power supply can be stored out of the way, as all controls except the AM-CW switch are on the r.f. unit. The Thor is wired for push-to-talk operation, although normal control methods are also available through the TRANSMIT-RECEIVE switch. A 3-8 ohm speaker should be connected to the jack on the rear apron of the r.f. unit. As the unit is turned on and the lamp illuminates the panel, it will be noticed that the S meter will

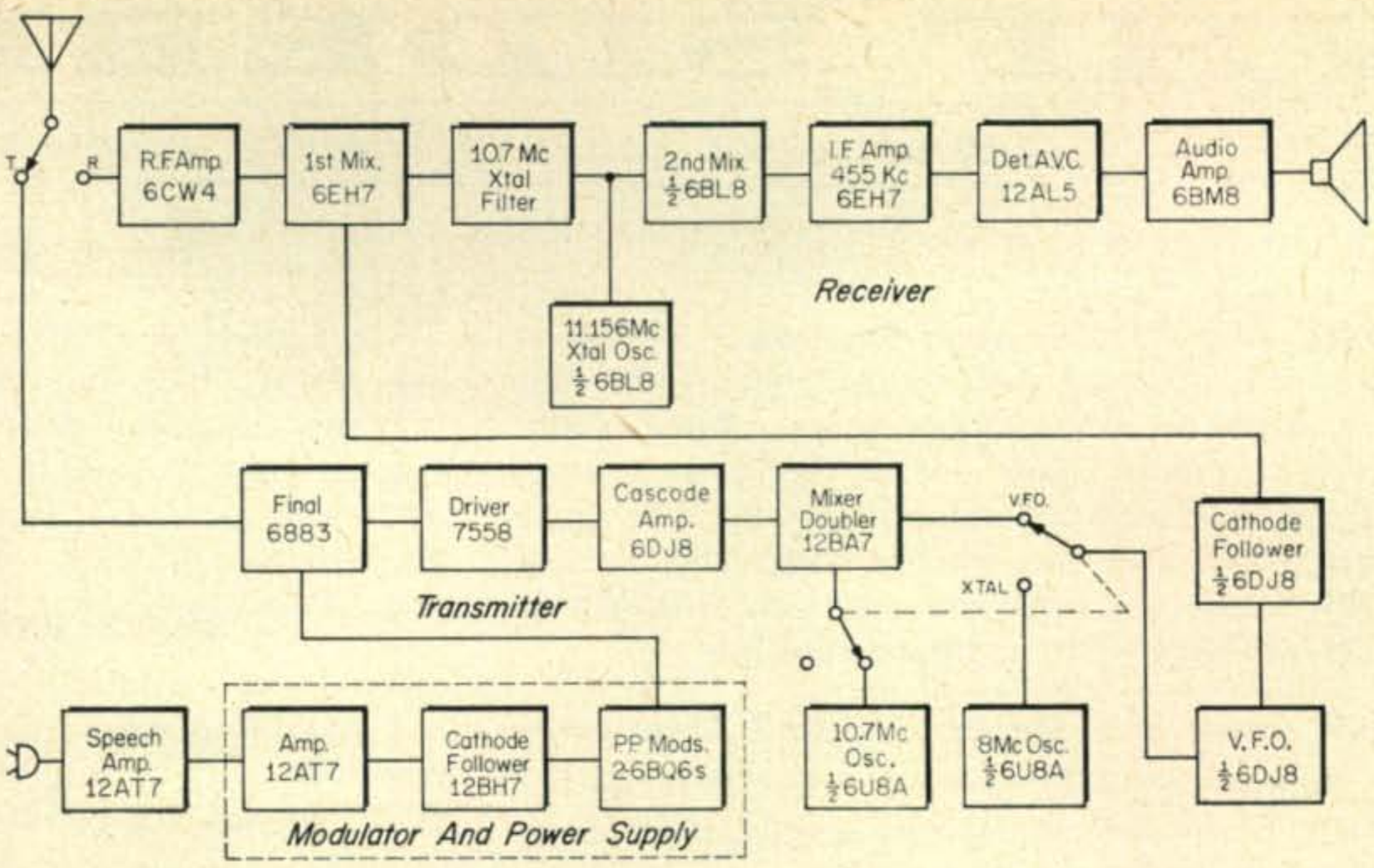


Fig. 1—Block diagram of the new Clegg Thor 6 50 mc transceiver. Note that the transmitting v.f.o. also serves as the tunable oscillator in the receiving section. The 6883 final amplifier tube operates "straight through" at 50 mc and is conservatively rated at 60 watts input. Two 6BQ6's operate in push-pull as modulators furnishing that "typical Clegg" effect. The v.f.o. (½6DJ8) operates in the 39.3-41.3 mc range and is mixed with the 10.7 mc crystal oscillator output from ½6U8 in the 12BA7.

swing up to full scale initially, then gradually return to near zero during receiver warmup; this is normal for the circuitry employed.

Tuning the receiver for the first time can be quite a shock to those uniniated with the Thor's very selective tuning characteristics. With this transceiver, one tends to tune at a slower rate than usual, stopping to listen to the many stations now heard for the first time. A very sensitive receiver, the Thor makes Q5 copy out of even S1-2 signals! QRM is almost non-existent, since the selectivity permits separation of even the closest signals. If local noise becomes aggravating, simply injecting the ANL solves the problem. Tuning c.w. and s.s.b. is easy through a unique three-step b.f.o. control on the far left front panel of the r.f. unit. With the control in the AM position, no beat is present. Advancing it through the three b.f.o. positions to the right, however, injects a beat tone into the receiver in graduated degrees, depending on the strength needed to obtain the best readibility on the received signal. For example, a local s.s.b. signal might require more signal injection than a weaker one 100 miles away. The Thor 6 handles them both supremely.

The transmitter is amazingly simple to operate. When you are in transmit, either through the TR switch or push-to-talk, the S meter converts to a relative output meter for transmitter loading; all controls are simply tuned for maximum output. With a 1:1 s.w.r. into a standard 52 ohm antenna, the meter registers approximately half-scale. Measured output under test conditions was 45 watts, a hefty signal to say the least! Effective low-pass circuitry kept TVI to a minimum at this QTH.

When using the Thor in the v.f.o. position, the transmitter is always "tracking" the receiver, i.e., the v.f.o. is on the same frequency as the receiver. This concept is altogether new to VHF, although a great number of lower frequency commercial s.s.b. transceivers have been using this principle for quite some time and have been well received. Basically, what it amounts to is this: when you answer a CQ, you answer on frequency. When you are calling a CQ, you listen on frequency. If you start to tune the receiver after your CQ, you must return the dial to your original calling frequency before replying. An easy cure is simply to mention when calling CQ that you will reply on the frequency of the answering station. This way you can tune the entire band and any caller will know where to listen. Of course, you can always use the optional crystal control or an external v.f.o.

Modulation is what the local six meter gang terms "typical Clegg." Roughly translated: maximum audio, superb clipping characteristics. It's phenomenal how many stations comment on the fullness of "talk power" inherent in the Thor 6. "Really cuts through . . ."

Those whose eyes light up with talk of VHF mobiling will be interested to learn that the Thor with its 60 watts input can be used in the family buggy. An optional Clegg Model 418 transistorized 12 v.d.c. power supply/modulator is available which can be permanently installed in the car. The Thor r.f. unit can then be plugged into either the mobile supply, or the a.c. supply in the shack. Just connect the cable, and you're in business!

Of special interest is the Owner's Manual, shipped with each unit. This guide is a handy item, especially when the Thor 6 is to be put in the mobile, etc. Offering many hints and operating data for those unfamiliar with this type of transceiving, it suggests new ways of calling and working stations, making the most of each feature. Large fold-out schematics are included as well as parts layout sheets, enabling the purchaser to become well acquainted indeed with his new Clegg Thor 6.

At this writing with my Thor four weeks old, 936 different stations have been worked in 24 states. It went with me on vacation providing a convenient, compact 6 meter station for use at the trailer, home, mobile and mountaintopping. I was amazed at the number of stations amassed during the recent VHF contest, especially when compared to my usual totals. The Clegg Thor 6 is available through your dealer at $349.95. ■

VHF SIDEBAND

an exclusive feature of The VHF Amateur

BOB HEIL, K9EID*

ONCE AGAIN THE Summer Sporadic *E* season is over and it leaves each of us to sit by the first fire in the fireplace pondering over some of the terrific contacts made during the season. Some of the VHF s.s.b. operators have much to think about, as I can see it from here! The activity grows more and more everyday and it shows up very well in a real good band opening.

East Coast VHF Single Sideband Association

This is beginning to start a new trend in the VHF circles which has just been talked about but now, thanks to an aggressive group of VHF s.s.b.ers, something has been done. The East Coast VHF Single Sideband Association had their quarterly meeting in the middle of this DX season and elected Sam Berlin, WA2CVF, as President; Vito Bono, K2PXP, Vice President; and Abe Cutler, WA2ONB, as Secretary-Treasurer. The meeting was well attended by most of the active VHF sidebanders in the Philadelphia-New York area.

John Super, K2ZBX, is the outgoing President and he presented a very large and attractive trophy to the Association to be given to the first VHF Sidebander who works 48 states. This is the only organization to date that is offering an award of this type and it would certainly be quite an honor to win this trophy!

*402 Border Street, Marissa, Illinois.

Abe Cutler, WA2ONB, is acting as custodian and all VHF s.s.b. stations that have worked the 48 States are welcome to send their cards to him. You will find Abe and the rest of the Association on 50.108 mc every Sunday morning at 11:00 AM. Be sure and look for them!

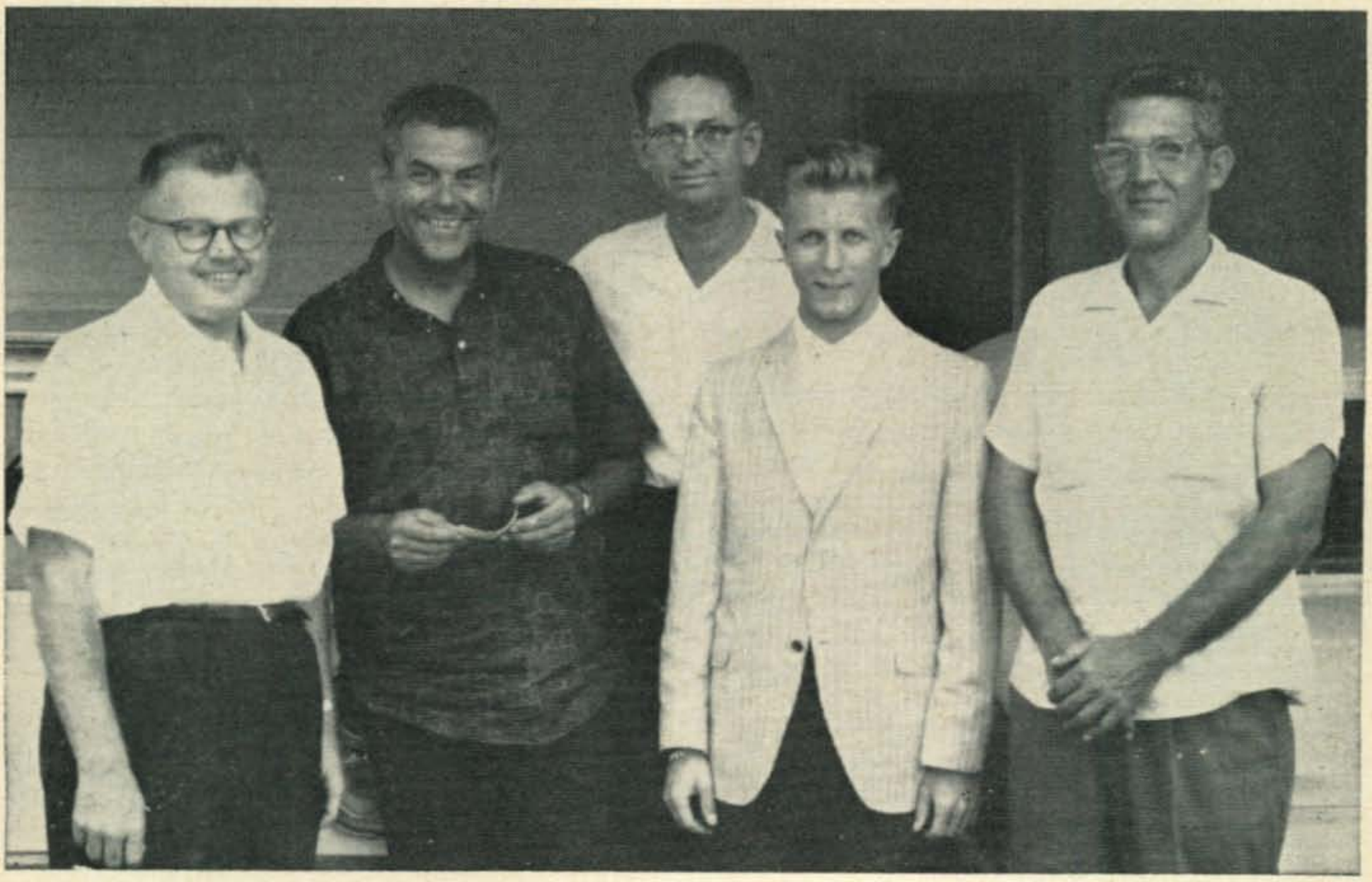
W.A.S. VHF SSB Box

With such an attractive item in store for the first station to work the 48 on VHF s.s.b., it would be only appropriate to begin a *W*orked *A*ll *S*tates box for two-way s.s.b. VHF contacts on *both* 6 and 2 meters. All amateurs are invited to send in your standings (no cards please, yet). I will compile the list as soon as enough get them in and each of us will know where we stand. I am expecting a letter from each of you, now! Don't forget.

Activities

Milt, K4EBT-W4RLX, finally got around to representing Tampa, Florida and wrote a nice letter. He is working stations like mad down in the "Land of Fun and Sun." Since June 1962, he has worked 38 states and 4 foreign countries on two meters! Nice work, Milt. Let's hear more . . . Jim, K9RKU, at Sparta, Illinois, has his Apache and SB-10 on two meters using the Halort mixer and the 8 over 8 "J" beam with a new Drake 2B and Parks to hear with . . .

[*Continued on page 80*]



This photo was taken during your columnist's recent trip to Florida. Left to right, W4GJO, K4HLA, W4WHF, K9EID and WA4BYR.

DX REPORT

an exclusive feature of The VHF Amateur

BOB BROWN, K2ZSQ*

AT THIS WRITING IT IS but a few days since total eclipse of the sun on July 20th. Many VHF-minded amateurs who otherwise might not have been on the air were observing conditions during that hour to see what would develop on the 50, 144, 220 and 432 mc bands. As *CQ*'s able PROPAGATION columnist pointed out a while back, a total eclipse of the sun has the temporary effect of inverting existing conditions; that is, day changes into night briefly. Unfortunately in this section of W2 land an overcast condition existed which prevented much actual sighting of the event, although there were enough breaks in the clouds to permit a few fuzzy photographs. But what did happen on the VHF bands? Frankly, we wonder. So many reports have arrived here (mostly over the air) differing widely, that to say we're perplexed would be an understatement. Many areas have reported "greatly improved tropospheric conditions" on the bands above 144 mc while others have simply said that "things were normal here." On 50 mc, however, Sporadic-*E* was rampant during much of the day and it would be extremely difficult to attribute any of the excellent DX conditions to the eclipse alone. But contrary to this rather basic premise, many hundreds of six meter amateurs are currently expounding the "results of the eclipse" to all who will listen, even stating call letters of DX stations worked. Rather than to try to guess what actually did occur at this time, we'll wait a bit longer and try to present more extensive data next month. By that time all reports should be in and we'll be walking on firmer ground. In the meantime you can make preparations for the next near-total eclipse of the sun: 1970 . . .

These two boys were caught in the act during the last contest, trying to bypass that resistor and get more soup out of the rig. Faces belong to (left) Bob DeFeo, K1YTF, and (right) Lou Marcarelli, W1JGU. Six meters, natch.

News From The Mailbag

San Salvador, Bahamas: Harold Lund, VP7CX, tells a bit about his recent trip to Santo Domingo.

"Haven't had much time for letter writing while on my trip. Got back here on the 4th of July. Glad to report that the trip was pretty much a success. Worked about 200 stations in W1-2-3-4-5-8-9-Ø, KP4, HI8 and YV5. Worked Florida almost every day, but the only real good opening to the East Coast was Tuesday, July 2. Worked about 125 stations that day.

"Cards for HI8XHL should go through W9ZDI. I will have special cards printed for the trip, so it will take a little time. I have received my new batch of VP7CX cards, so am now in the process of getting caught up. Hope everyone will be patient.

"There are some other stations on in Santo Domingo. HI8XAG is on 50.022, HI8XAG/m on 50.034, HI8RO on 50.150 mc. HI8RO is sometimes manned by other operators. Was operated by HI8ORC on July 2 during the opening.

"Worked FP8CB last Saturday afternoon (July 13th) and FP8CG Sunday morning. Also worked WØGNS in North Dakota Sunday for state number 38 on six meters." *Congratulations, Harold! We'll be looking forward to seeing your article on the Santo Domingo trip soon.*

R.R.F. Notes

Reports have been slipping a wee bit lately, so I guess it's time we prodded you again. We have official *R*eader *R*eporting *F*orms available in any reasonable quantity to those of you who would like to become contributing reporters. Just drop a line to me at the address on the first page of the column requesting your supply. We can always use more reporters who can take the time to let us know what's been going on in their area. So get out the pen and ink and get with it!

K4NEH of Portsmouth, Virginia, has really been makin' hay on six lately. Skip contacts include VP7CX . . . WAØDJK wants skeds on six meters. Write Harry I. Silver, 611 Seward, Omaha, Nebraska, 68104 for further info. Harry's worked K7MAC in Salt Lake City, Utah, recently with 59+ sigs . . . K8REG been busy getting W8NAF/7, XE1OE, WA6MIC/7, K7OAE/m, K6JIC, and HI8XHL on six. "With my contact to Idaho through WA6MIC/7, I now have 48 states on 6 meters worked and confirmed." . . . VE3CVX snagged WA6YIT, WA6TYZ, W5UNU, W5CDG, K4PBP and

[*Continued on page 81*]

*Editor, *The VHF Amateur*, 300 West 43rd Street, New York, N. Y. 10036.

UHF ROUNDUP

an exclusive feature of The VHF Amateur

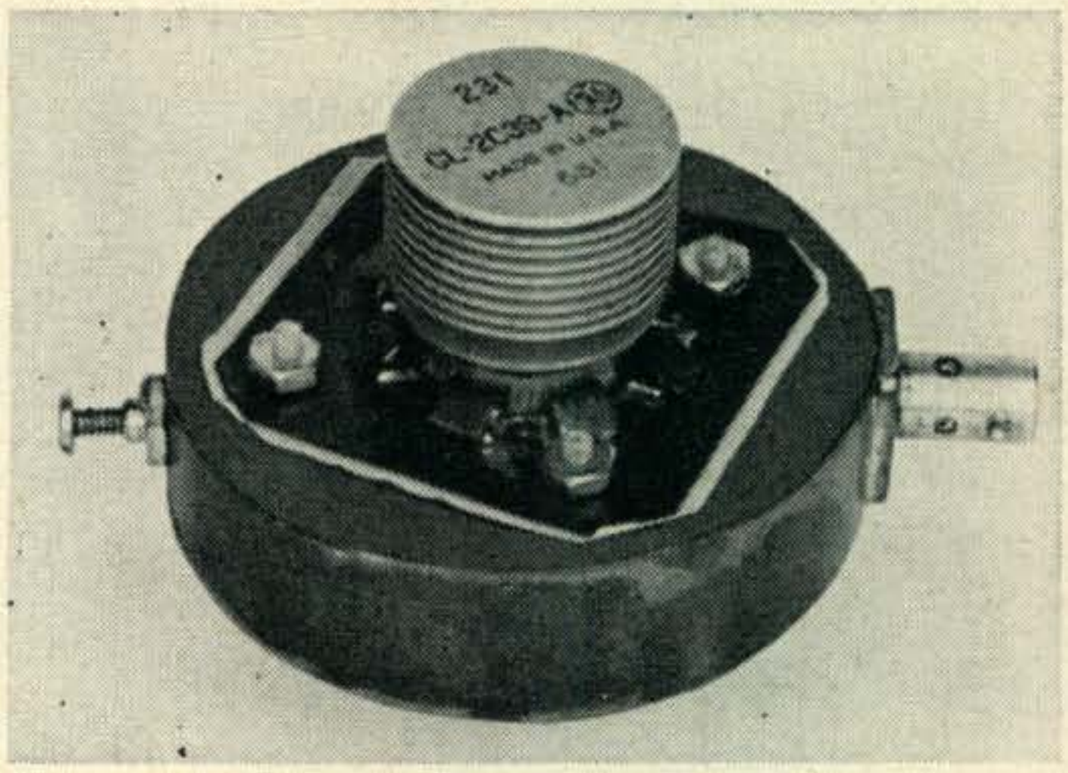
ALLEN KATZ, K2UYH*

RIDING THROUGH THE MOUNTAINS of Scotland generates an eerie sensation—you almost feel a chill. If you've ever travelled on the plains at night, you might have an idea of what I am trying to express. Yet, it is different out here. Just a few hours ago we arrived at this rest point, about two miles from a half-deserted mining town called Lead Hills. I am told that it is the highest point in all Britain. To say the least, the view is fantastic. We arrived in Europe about two weeks ago and since then have been travelling across the country by motor scooter (a rebuilt '56 Lombretta). We have had our mishaps —the rear wheel came off—but on the whole, the trip so far has been rewarding. We are collecting some information and pictures on the European TV systems. The TV antennas here are bigger than those of amateurs back home.

The next big city we shall be in will be Amsterdam, Netherlands. Should be there in two or three days if all goes according to schedule. In the meantime, we'll go technical and show you a little gem of a 1296 amplifier.

1296 Mc Cavity Amplifier

K2CSM broke the transmitter barrier a while back when he designed the 1296 mc amplifier presented in the February, 1962, *The VHF Amateur*. Not only is this transmitter small and highly efficient, but it is also extremely simple to construct. As arranged and presented in fig. 1, the amplifier runs approx. 30 watts input with 5 or 6 watts of 1296 mc driver output. An APX-6 makes an ideal exciter.



View of the plate cavity section of the K2CSM 1296 mc amplifier. The grid cavity is not attached, although it could be with no difficulty. We used a square capacitive plate on the top and bottom, although K2CSM's specifications for a complete circular plate might be preferable. BNC connector shown is the output loop connection, L_2. Bent-over flanges act as retaining clips.

The amplifier consists of a cavity made from a ¾" length of 3" diameter copper pipe (see fig. 2). Two disks 3" in diameter are cut from copper sheeting. A 1¼" hole is drilled into the center of one disk and a ¾" hole in the other. The two disks are then soldered across the top and bottom of the ¾" high pipe. The side with the larger hole will be the plate side, and the smaller, the grid side.

*48 Cumberland Avenue, Verona, New Jersey.

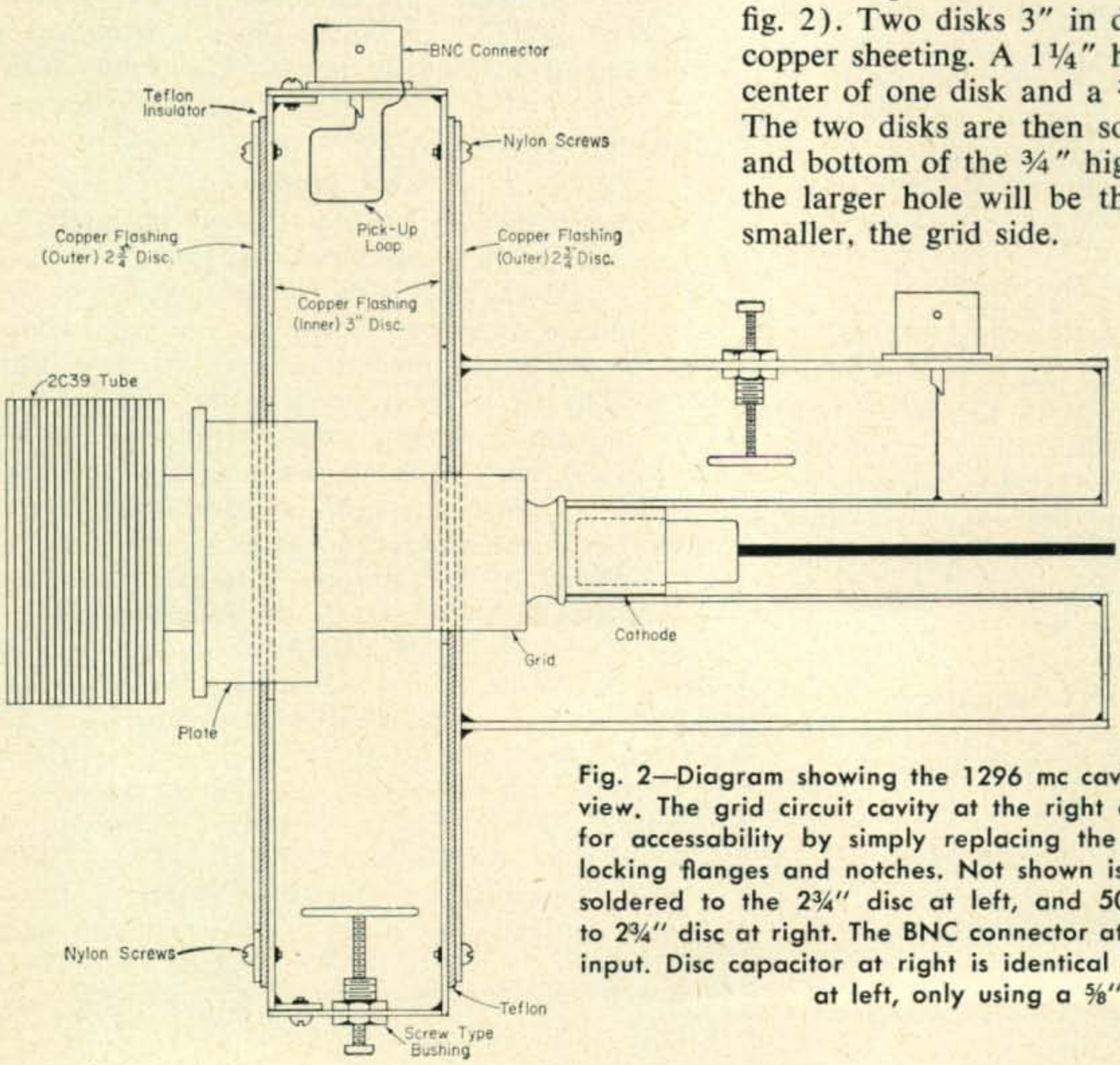


Fig. 2—Diagram showing the 1296 mc cavity amplifier in cutaway view. The grid circuit cavity at the right can be made detachable for accessability by simply replacing the solder joints with interlocking flanges and notches. Not shown is RFC_1 in the B-plus line, soldered to the 2¾" disc at left, and 500 ohm resistor soldered to 2¾" disc at right. The BNC connector at the far right is amplifier input. Disc capacitor at right is identical to plate cavity capacitor at left, only using a ⅝" *plate*.

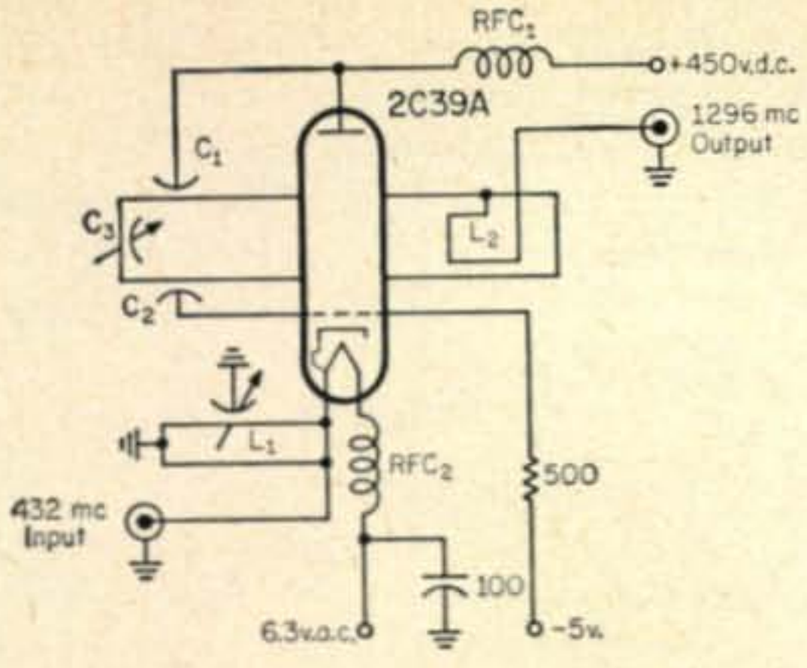


Fig. 1—Schematic diagram of K2CSM's cavity amplifier for 1296 mc. See text for data on C_1, C_2 and C_3.
L_1—1" copper strip. See text.
L_2—1" loop. See fig. 2.
RFC_1—3t. #18, ¼" dia.
RFC_2—6t. #18, ⅛" dia.

Two more disks are cut 2¾" in diameter. In the center of one cut a hole 1-1/16 in diameter is drilled to snuggly fit the plate of the 2C39A. The other hole should be ⅝" in diameter to accommodate the grid.

A ⅜" hole is drilled onto one side of the copper pipe for a BNC connector, onto which is soldered a 1" length of wire for an output pickup loop. On the opposite side of the pipe a ¼" hole is drilled for a screw type bushing, through which a disk type capacitor (made from a ½" circle of sheet copper) can be controlled.

The 2¾" copper disk with the larger hole is centered over the plate side with a thin sheet of teflon (containing a hole of equal size) sandwiched between it and the cavity. Same procedure is followed for the disk with the smaller hole on the other side. Both disks are held in place by means of nylon screws.

The 2C39A is fitted through the cavity as shown in the photograph. A coaxial cavity on the grid side is now constructed (this is not shown). This cavity was not presented in the original *VHF Amateur* article, but is a recent origination of K2TKN's.

The input circuit cavity is made from a 1½" diameter by 2¾" long section of copper pipe. The center conductor is made from a ⅜" diameter by 2⅜" long piece of copper tubing which is soldered to the center of the 1½" disk cut from a square of sheet copper. A ⅜" hole is drilled into the center of the 1½" disk to pass a wire up the center of the copper tube to the 2C39A's heater connection. A ⅜" hole is drilled into the center of the 1½" diameter pipe ¾" (from the end which is soldered to the 1½" disk) for a BNC connector. A lead is soldered to the BNC connector and the cavity center conductor. Another hole ¼" in diameter is drilled for a screw type bushing in the 1½" pipe (in line with the first hole), 1½" from the pipe's end for a disk type capacitor (made from a ⅝" circle of copper).

With this work complete, and voltage applied as per fig. 1, she's ready to fire up on 1296 mc. The feed system's dimensions will depend on the driver and the size of the chassis the amplifier

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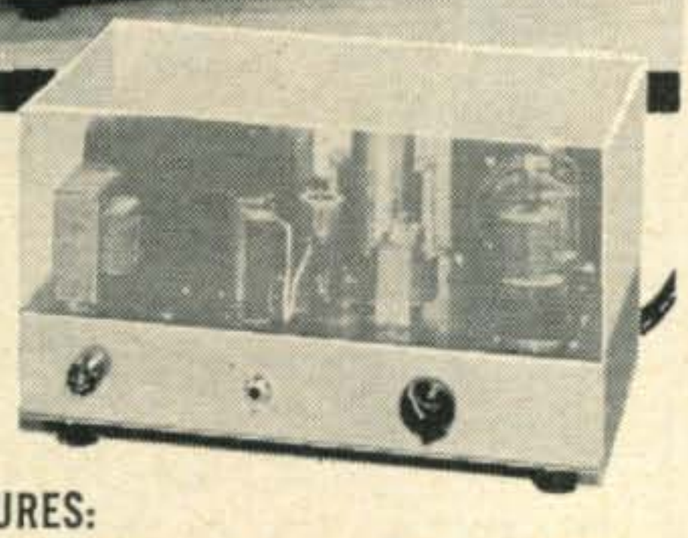
For further information, check number 19, on page 110

BRAND NEW FROM CLEGG LABS . . . THE
POWER PACKED
THOR 6
TRANSCEIVER
FOR 6 METERS.



Come up out of the noise . . . let 'em know you're around with a new 60 Watt **Clegg Thor** 6 Transceiver. Sound good? Here's the rest of the story.

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LABORATORIES
DIVISION OF SQUIRES-SANDERS, INC
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OAkwood 7-6800

For further information, check number 11, on page 110

is mounted on. A little experimentation should yield the desired results.

I might also mention that a 3CX100A can be used in place of a 2C39A in this circuit with the 500 ohm resistor being replaced with a 3K resistor going directly to ground for phone operation.

Stand By

Next month we should be able to present you with a first rate column, since we plan to stop for a week and relax at the Italian Riviera. In the meantime, bear with us and *please* keep those letters coming. Well, must stop writing now; lights go out at 10 o'clock, and it's just about that time now.

73, ALLEN, K2UYH/GM

VHF Sideband [*from page 76*]

W9BLZ has a new SR-150 ahead of his SB-62 . . . KØBST has moved to Indianapolis and the St. Louis area lost a tremendous VHF s.s.b. personality . . . WA4BYR has his real slick homebrew cavity final on 6 meters and it works very well . . . VE3CUR, Ray, is on 50 mc with a fine signal . . . KØABY is representing Cedar Rapids on two meter s.s.b. and has a fine signal . . . K7OFR has made things active on 6 from Tuscon and will give you a new state . . . Lafayette, Indiana, is well represented on two meters with the P&H gang getting active; W9GDS, Mow, es WQS are found on 145.20 each Sunday . . . WAØAHL, Dave, a new VHF s.s.b. station, has finished his SB-62 and is on two meter s.s.b. with his father's twenty meter station! Nice signal, Dave.

Late Minute Activities

W4CSN, Paul, has his 20A-Halort HM-20 and T-Bolt into the 8 over 8 "J" beam from Henderson, Ky., on 145.20 mc; take a look for him, he has a tremendous signal! . . . WØNYF, Ed, has his KWS-1 driving a new Halort HM-20 to T-Bolt combination into an 8 over 8 "J" beam from Overland, Mo. What a rock crusher from St. Louis! K9VWX is running wild from Winnona in the northern part with his T-Bolt and 64 element "J" up 100'.

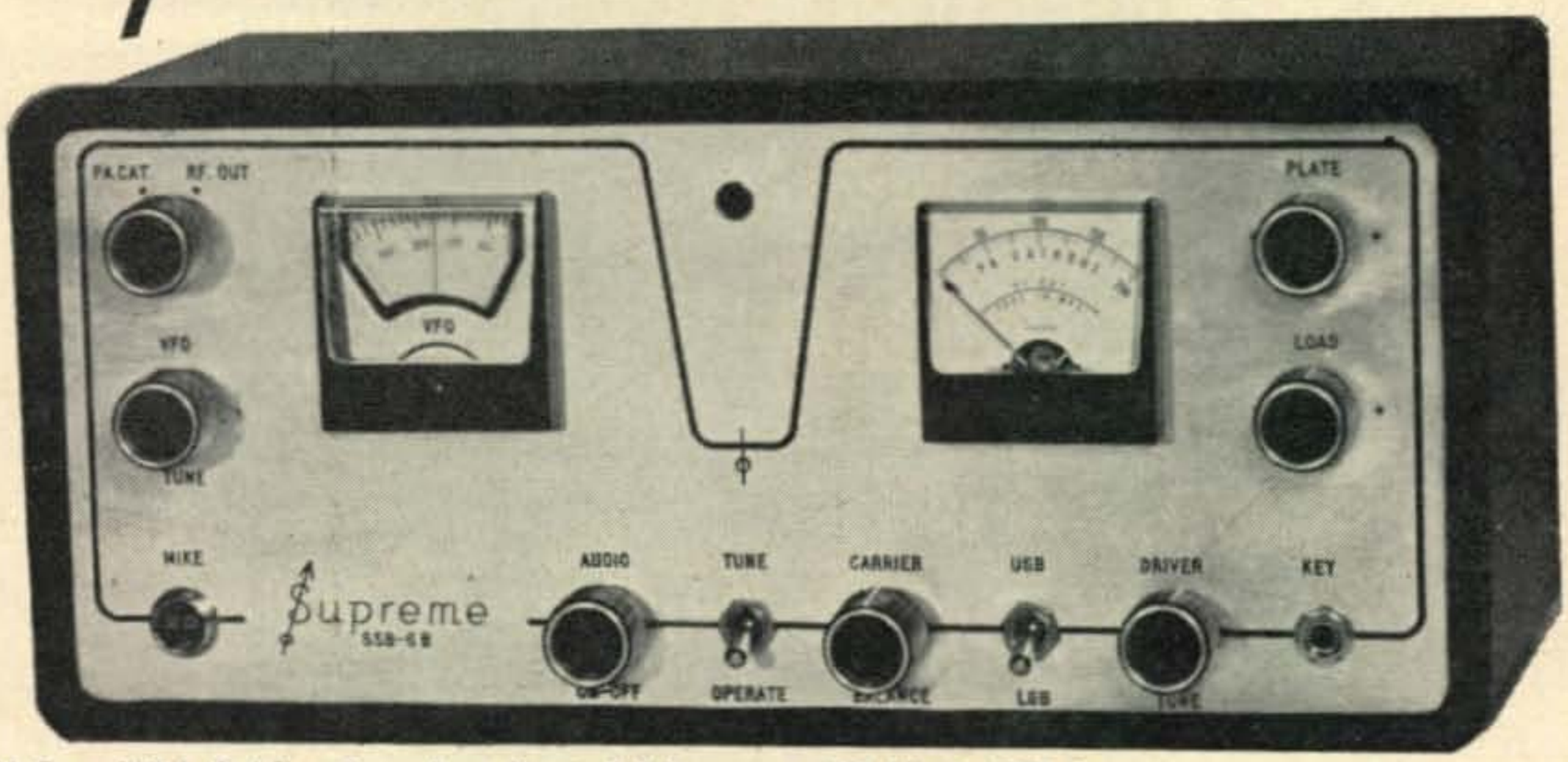
Wind Up

The month of July brought a nice tornado to Marissa so I have been busy cleaning up the 100' stick and antenna elements. The big 126 element antenna was a day from completion so it was saved. However, it is up now and be sure and drop me a card for a two meter schedule. Don't forget to send in your W.A.S. score as you set up a schedule. Hope to start the W.A.S. box immediately—so let's keep those cards and letters coming in friends, the new ZIP code needs to be activated! CU all next month.

73, BOB, K9EID

Watch for next month's feature article, "DXpedition to Santo Domingo," by Harold R. Lund, VP7CX/HI8XHL, in *The VHF Amateur*.

Supreme SIX METER SSB Transmitter



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For further information, check number 21, on page 110

DX Report [*from page 77*]

W4FLY during the first two days of July. . . . K8PEJ has gotten more than his share of DX lately, according to W8MBH . . . K8JGF worked VE4MA, K6KOJ and VE3BBX back on June 26 . . . K9CNN worked on July 1 (all on six meter phone) K6ITZ, K6SYR, K7HAW, KØGIC, WA6MWB, WA6RQY, K6LWC, K7ILB and VE4FO . . . WAØEIM in Omaha worked HI8XHL on June 29th in the Dominican Republic with 58 sigs. "Harold claimed I was his first zero-land contact from his location in Santo Domingo," sez Paul. WAØEIM would also like skeds with Oklahoma and North Dakota, c.w. or phone. QTH: 2316 North 69th Street, Omaha, Nebraska . . . K4PZT's list of DX worked recently from Dave's Knoxville, Tennessee, QTH includes K7KVK, W7CTW, K7IQI, K7OFT, KØMVM, VE4MA, KP4BEO, CO5CN, WA6MIC/7, WØBIM, WB6DTA, and K7CIN . . . W6IEY in La Mesa, California, in addition to numerous others snagged VE7ASM and VE6IP in June. Bill also reports hearing W5SFW and W5MJW calling "CQ KH6" on s.s.b. on June 30th . . . Bill Leath, W4IMX, 2406 Sterling Road, Nashville, Tennessee, wants skeds (50 mc) to Georgia on 50.160 "any day, any time." Bill's list includes such notables as CO2GS and CO2DU . . . W8PT writes, "still keeping skeds with K9UIF, W9OKB, W9BTI, W9OII and W8RQI on 432 mc with good results. No new stations heard on 432 mc; no Sporadic-*E* or tropo openings on two." Jack (forgot to put in his home address) of Benton Harbor, Michigan, wants skeds to Maine on 144.080 c.w. . . . VE3CVX, 112 Cluny Drive, Toronto, Ontario, Canada, wants skeds to West Virginia on 2 meters on 145.225. Will move frequency, however . . . K8REG, 4329 Renwood Drive, Dayton, Ohio, would like skeds with KL7 and KH6 on 50.085 mc Sundays and Wednesdays, 0500 GMT to 0515 GMT. "I will soon be on s.s.b. and c.w. only, at one kilowatt on both," adds Vince . . . WAØDZH sez the best DX for him was on July 2 and 3rd. WØYSJ was worked with s.s.b., his sigs 58-9, 420 miles. Also worked WØEMS, 225 miles; KØGQG, 225 miles; WØLER, 225 miles; WØLFE, 180 miles, and K9UIF, 225 miles. "July 6: Just worked WØRSP, 340 miles, for my 11th state. His sigs 56, a.m." . . . K9YEN worked the following on 6 meters on July 14th: K7TGI, K7TCZ, K7JXX (Wash.), K7VCH (Wyoming), K7JLM (Mont.), VE7OE and VE6CG. Also heard VE1UW, VE1IF, VE1ABL, VE3CRB, VE7AYA, WAØBMB (South Dakota), WØGNS (North Dakota), K7DTH/7 (Wash.), K7EIC (Wash.), WØHDF (Minn.), K1YQD (Maine) and W1HPC (Conn.) . . . W2TND's 2 meter report for the month includes 8 states worth of DX. W1JZD, in Groton, Massachusetts, was a 230 miler . . .

K7IQI in Bellevue, Washington, caught

[*Continued on page 83*]

W9DIA—Terry

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For further information, check number 20, on page 110

A Letter to the Editor

Dear Bob:

Well, it's happened. I refer to an urge to homebrew a little gem offered in the April '63 issue of *The VHF Amateur* by those two stout fellows from nineland and oweland, Bob, K9EID, and Ken, KØKYZ. The article, "The Sixer—On DSB" stirred my imagination and without a single drop being spilled, Mr. Reingold and I proceeded poste-haste to the "well stocked junkbox" to scrounge the mere eleven parts required in the balanced modulator. As the authors state, "these can be gotten from the junkbox if you have one of any size." Well, I have an entire cellar full as the XYL will regretfully verify but the really critical part, a dual 25 mickey mouse butterfly, was nowhere to be found.

Has any reader ever tried to purchase a dual 25 mickey mouse butterfly? No easy task, this. Let me tell you, Mr. Editor, half of the parts houses think you are overmodulating your marbles and the other half upon hearing the request, will close their doors and go back to repairing Fleming Valves.

Having firmly started the project and driving a total of 653.7 miles with my message for Garcia ("Say Buddy . . . Ya wuddent have a dual 25 mickey mouse butterfly . . . wudga?") no other course was open save to fabricate the component myself. I retired to my well equipped, highly mechanized kitchen table with two dual 12 mickey mouse butterflies purchased in a fit of desperation in a store in Teaneck (who repaired Fleming Valves by the way). I proceeded with the task at hand.

With great dexterity and perspiration normally found only in radio magazine offices at coffee time, I enjoined the two rotor shafts and four sets of plates in perfect axial alignment, yielding, at last, not a dual 25 mickey mouse butterfly, but a dual *24* mickey mouse butterfly. Now if fortune should cause her countenance to smile upon me this would null my carrier evermore.

After two evenings of tedium (the authors allowed only one hour for the total construction of the balanced modulator . . . apparently they take two or three for more sophisticated projects such as TV station, etc.), I was ready to assemble the various subunits and give the rig the smoke test. The scientific method used here at WA2NZE is to plug 'er in first and call the fire department later. A pleasant surprise was in store for me, however, as the rig worked fine biz right from the start and has been going with vigor ever since.

It is then with great admiration that I compliment the designers and the Editor for bringing your readers the type of information heretofore described. If, however, you could produce similar designs for equipment the parts for which all could be purchased at the A&P, I for one would be so grateful that I'd stop writing letters to the editor.

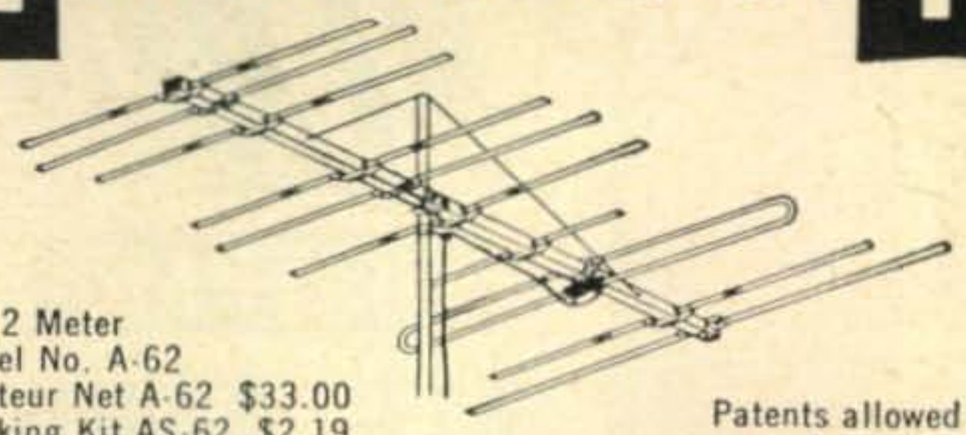
MARVIN SARAFAN, WA2NZE

DX Report [*from page 81*]

WA4HOT, WØCVR, and KØREE, "plus normal skip into California, Arizona, Colorado. Also heard some Montana on June 28 but didn't try to work it. K7CML was coming in about 20 over 9. Ken would like skeds to Hawaii on 6. Write 404 Detwiller Road . . . K9PVS in Alexandria, Indiana worked WA4FRJ, WA4CNR, W5BYZ, W5MGD, WØBUT/4 and W5JFD on skip in early July . . . On July 3rd K9YEN worked KØEIC in Rapid City, South Dakota, at 11:42 AM CDST; K7CMU, Miles City, Montana at 2:00 PM, K71OA, Great Falls, Montana at 2:17. All 6 meter phone . . . K4UVD worked K7GBZ (Idaho), K7YOF (Idaho), and K7SMQ (Wash.), on July 16, while snagging VP5BB and CO5CN on the 14th and 13th respectively. Jack would like skeds to Kentucky any night after 2100 EST, 50.4 mc or higher. Write K4UVD, 1029 Airport Road, Gainesville, Georgia . . . WAØDJK, Omaha, worked K8QPD, W7RZY and K7KRV, in early June . . . WA2ODR, Holland, New York, piled up the double-hop stuff in July with WA6AWI, WA6SXM, WA6PRS, WA6RGC, WØBRH . . . K8PEJ reports quite a bit of DX, but neglected to note what band . . . K9CIF sends in several sheets of 6 meter skip, too much to detail here, but Mel sez he would like skeds to New Hampshire on 50 mc any morning. QTH: P.O. Box 61, Union Mills, Indiana . . . WAØEIM in Omaha sez, "I worked 31 states plus Ontario and Halifax during the big two day opening from this locale —also contacted Mexico, but not good enough for a signal report. I did miss getting Mississippi and Illinois, both which were in here several times. Ground wave DX has been with WAØFKU in Louisburg, Kansas (about 260 miles). Would like sked with the Dakotas, c.w. or a.m." Paul's address is 2316 North 69th Street, Omaha 4, Nebraska. "Wish to take this opportunity to thank Harold R. Lund, VP7CX, for the wonderful work he is doing on 6 meters from the Bahamas and the many interesting reports that I find in the *VHF News Bulletin* from him." *We're with you, Paul!* . . . More K7IQI—Ken's worked so many skip stations that you'd think he's FG7XT on a Saturday night! Too long to print here, but if you're active, you're on his list . . . WA4BMC also drops in her three pages of VHF extravaganza including W6's galore, VE2BEW, and more. "Big Mike" is CHC #683 . . . K9PVS drops in again to request skeds to Illinois, Wisconsin, Michigan, West Virginia on 50 mc after 2300 EST on weekends. Write to: Steve Reavis, R.R. #3—Box 93, Alexandria, Indiana.

73, BOB, K2ZSQ

2 ANTENNAS IN 1



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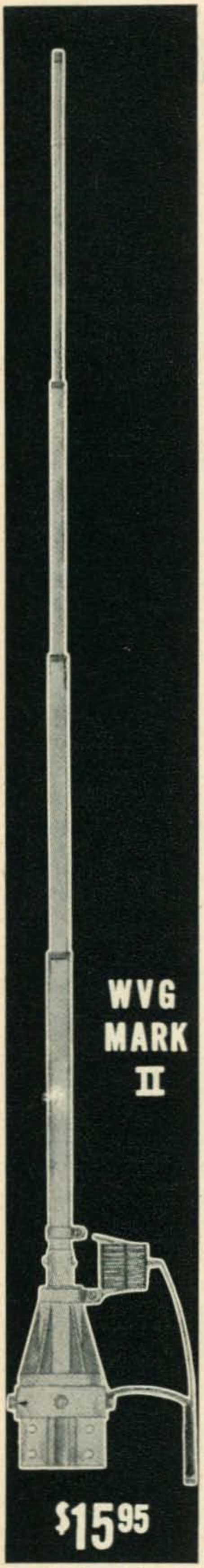

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Announcements [*from page 14*]

on-the-air. Operations are expected on 80, 40, 20 and 15 with special QSLs to those worked. Other Boy Scout stations will be on the air, so look for them on the above date.

Correction

The control grid (fig. 1 "The Simplest and Cheapest Rig") August, page 24 should be pin 5 *not* 2 as shown.

"A Solid State Fixed-Tuned Receiver," July, page 20, should show an additional 4.7K resistor between the base of Q_2 and the existing 4.7K resistor.

Transistor V.F.O. [*from page 26*]

drives the 6AH6 which formerly functioned as the LM v.f.o. doubler in the exciter. It is connected to the transmitter through 10 feet of RG-8/U cable. The 2N384 is so stable in this oscillator circuit that it could actually be keyed on and off for c.w. by merely opening the 12 volt battery lead, with no chirp or frequency instability!

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The v.f.o. is used when operating on the Navy frequency of 4015 kc and it keeps me on frequency with better than the required stability of .003%, as evidenced by my stable zero beat with station NPG on that frequency. It is a constant source of joy when operating in the amateur bands also. There is absolutely no drift from this source anymore!

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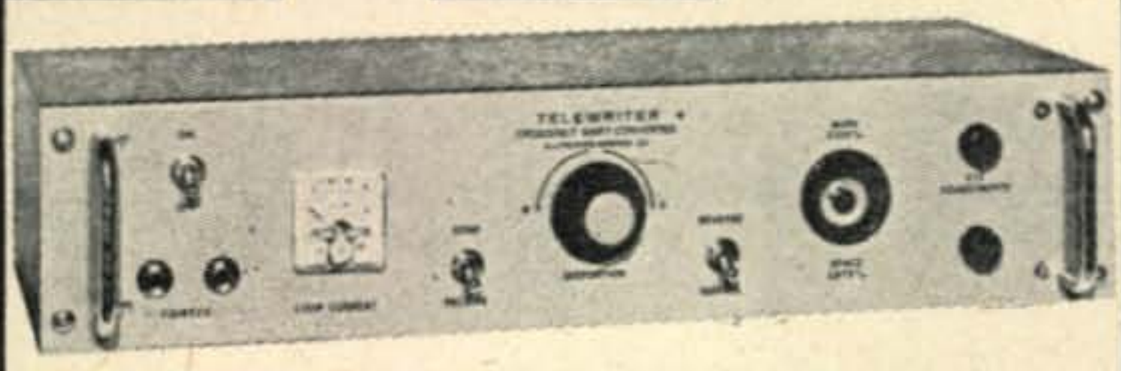

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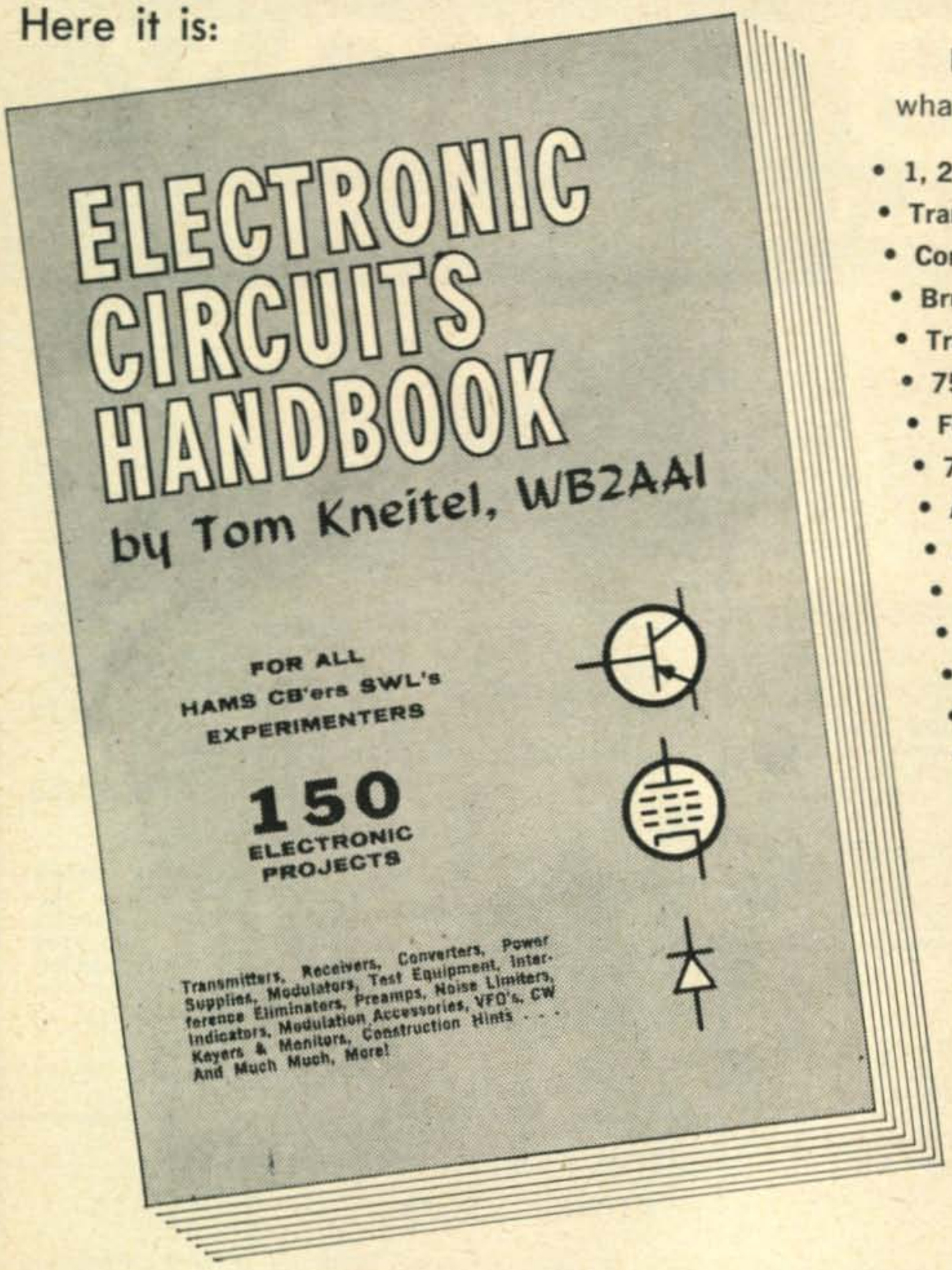

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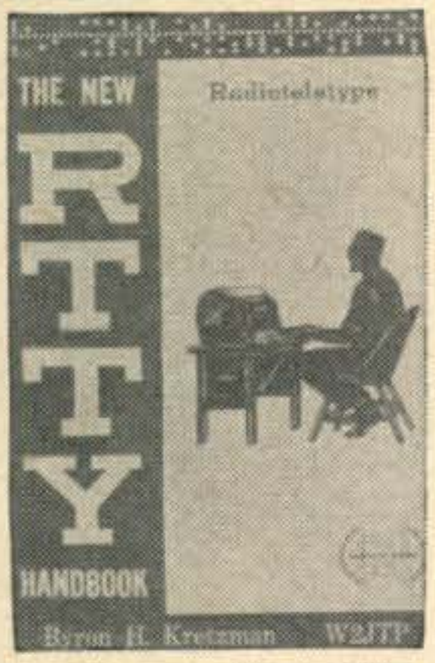

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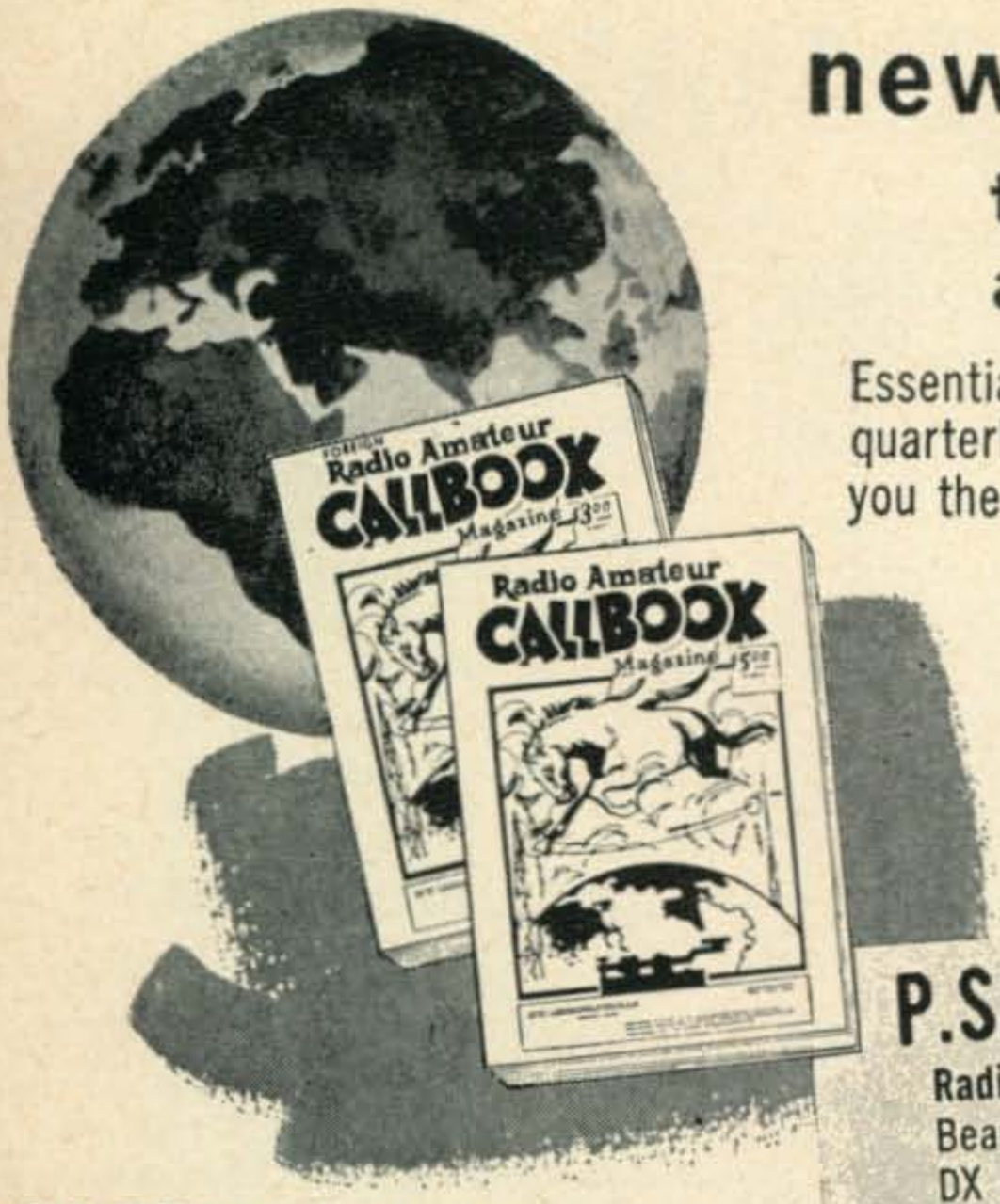

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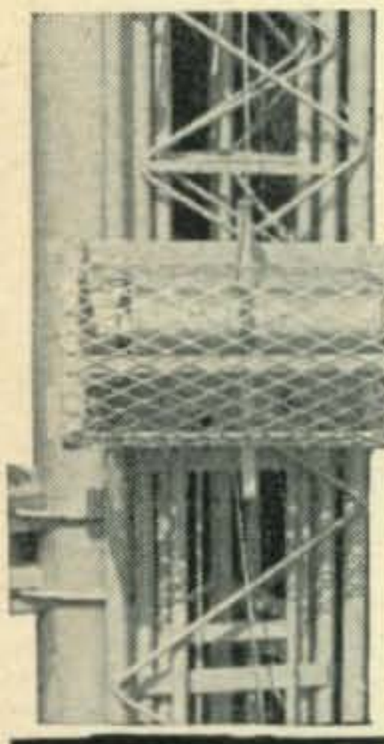

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PE-73 D.C. Source [*from page 32*]

wires carefully up into the junction box on top of the unit, making sure they clear the rotating armature. A rheostat connected between these two wires will provide the output voltage adjustment.

The junction box on top provides a convenient place to mount the voltage control and the generator output terminals, as well as any metering desired.

An old car ammeter provides a cheap and helpful monitor of what the unit is doing. Also, a 30 amp fuse is put in the output to protect the armature in case the output is accidentally shorted.

Wire up the generator as shown in fig. 2.

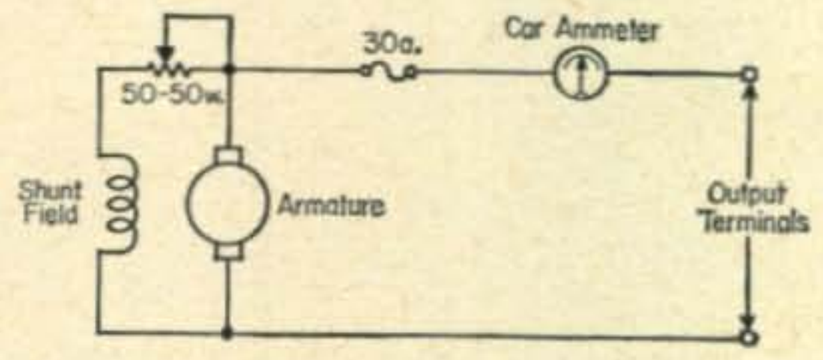

Fig. 2—Wiring diagram for the converted PE-73 dynamotor. Output voltage can be varied from 0-28 volts by the 50 ohm field control.

Testing

Well, there's your low voltage generator! Hook the V-belt to a motor (about ½ hp) with a large enough pulley to turn the dynamotor about 4000-5000 r.p.m. in the *same direction* as the unit ran when it was hooked to the d.c. source in the initial checks.

The generator is now ready for your use. If it is to be used in a dirty location, the low voltage end cover may be partially cut away to provide clearance for the V-belt, and then put back in place.

If you desire a low voltage output from the generator, you may find that it is not obtainable when there is no load on the generator. This is normal, and the voltage will drop as soon as some load is applied to the generator.

The voltage regulation of the unit is quite good due to the compound winding of the dynamotor. As the load current increases, the series field produces a stronger magnetic field. This boosts the generated voltage to compensate for the increased drop in the armature, thereby tend-

[*Continued on page 104*]

DX [*from page 50*]

cago on September 14th. Things get under way at 1:00 P.M., Chicago time.

Mac Reynolds, W9EVI, is Chairman and Mac is also handling registrations. His QTH is 664 Caroline Ct., Deerfield, Ill.

All DXCC holders are invited and any non-W will be the dinner guest of the gang. DXCC is

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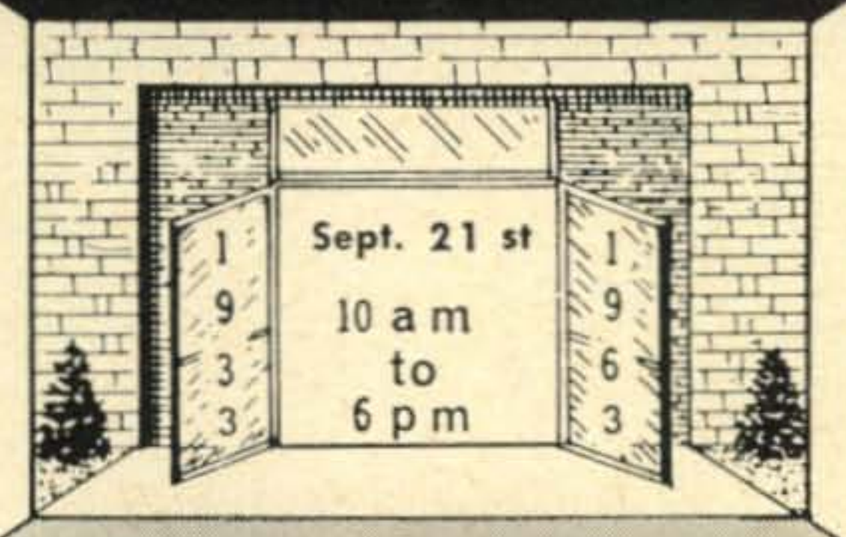

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COME PREPARED—MANY CASH SPECIALS

For further information, check number 44, on page 110

PREMAX

CENTER LOADED ANTENNAS

Series B — For 2 to 8 Mc., 75, 20 and 10 meters.

Includes 6-foot tapered stainless whip mounted above a loading coil, and 2-foot stainless base rod with couplings to fit any standard mounting. Coil has special hardwood core and is waterproofed.

Shown: Style BXS. Other styles and frequencies also available. Ask your dealer or write for free bulletin on complete line of antennas and accessories.

PREMAX PRODUCTS
DIV. CHISHOLM-RYDER CO., INC.
6315 Highland Ave. • Niagara Falls, New York

For further information, check number 45, on page 110

NOW—15% OFF ON PRECISION CRYSTALS!

EXTRA SPECIAL • SEPT. ONLY!

$1.95

ANY FREQUENCY—7000-10,000 K.C.
HC-6/U Fundamental Plated Crystals
Finished to .005%
.093 Pins For This Special Only—15¢ extra

BOMAR CRYSTAL CO.
Dept. A., P.O. Box 481, Somerville, N.J.
HC-6/U Plated Crystals

FREQUENCY RANGE	TYPE	REG. PRICE	SPECIAL
2500-6999 KC	Fund.	$5.80	$3.65
7000-9999 KC	Fund.	3.75	3.10
10000-15000 KC	Fund.	4.25	3.50
15.0-21.9 MC	3rd Mode	3.85	3.25
22.0-29.9 MC	3rd Mode	3.85	3.30
30.0-45.0 MC	3rd Mode	4.25	3.50

UPON REQUEST, FT-243 PINS (.093" dia.) CAN BE HAD ON ANY HC-6/U CRYSTAL AT NO EXTRA CHARGE.

All crystals finished to .005% tolerance. Fundamental crystals are supplied for oscillator circuits having 32 $\mu\mu$f capacity, unless otherwise specified. 3rd overtone crystals are supplied for series circuits unless otherwise specified.

Freq. and Quantity .....

Enclose: $..... Check ☐ Money Order ☐

Name .....

Address .....

City..... Zone..... State.....

For further information, check number 46, on page 110

BARRY ELECTRONICS

Squirrel-Cage Blower: 115 VAC @60 CPS. Rectangular 3"x3" opening. W/mount flange. Fasco. R/E. 8½"x7"x8". 6 lbs. Order cat. #12-22. ..... **$9.75**
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IF IT's TUBES YOU WANT. BARRY HAS IT. WE HAVE THE LARGEST DIVERSIFIED STOCK IN THE COUNTRY. LISTED ARE A FEW TYPES. IF YOU DON'T SEE IT, ASK FOR IT.
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Operator's Headset—W.E. Type #52 -A. This is the regular headset used in telephone switchboards and monitor boards and ideal for Ham-Radio Operator's use. Complete with cord and plug. **$19.50**
Dolly—for moving furniture, Ham-Gear, equipment, etc. Excel. constructed wooden dolly with ball-bearing wheels. 27"x17"x5½". Order the Dolly-O. Only **$14.95**
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RCA WR-46A Video-Dot/Crosshatch Generator (reg. net $179.50) **Sale price:** **$108**
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National NCX-3 Tri-Band SSB Transceiver. Only 19 lbs. **$369.00**
COME IN AND BROWSE. MONDAY TO FRIDAY—Thousands of items that we cannot list in an ad. MON. TO FRI. 9 to 6. SATURDAYS 10 to 2 PM (Free parking on Street Sat.) Mon. to Fri. parking lot 501 Broadway, WRITE FOR BARRY'S Green Sheet #11.

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WALKER 5-7000 (Area Code: 212)

☐ Enclosed is money order or check and my order. Prices FOB NYC. Shipments over 20 lbs. will be shipped collect for shipping charges. Less than 20 lbs., include sufficient postage. Any overage will be refunded. Fragile tubes shipped via Railway Express.

☐ Send copy of new 1963 "Green Sheet" Catalog #11

☐ Send information on: .....

☐ I have available for trade-in the following: .....

.....

Name ..... Title

Company .....

Address .....

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For further information, check number 35, on page 110

not required of non Ws. It looks like a swell show, as usual, so get in touch with Mac as soon as possible.

Awards

ALL-PUERTO RICO AWARD Issued by the DX Club of Puerto Rico for confirmed postwar contacts with the seven Puerto Rican districts of San Juan, Arecibo, Aguadilla, Mayaguez, Ponce, Guayama and Humacao. If in doubt about any location, check Directory of Post Offices (POD Publication 26) where each town is listed with its corresponding district, or inquire at the club with self-addressed, stamped envelope. Endorsed all one band/mode. Send list, certified by two hams (amateurs) showing date, band, mode and QTH. Send fee of $1.00 or 10 IRC to DX Club of Puerto Rico, P. O. Box 10525, Caparra Heights, Puerto Rico.

E. W. MAYER MEMORIAL AWARD Issued by the Puerto Rico CHC Chapter 20 in memory of the late KP4KD for confirmed contacts with 5 members of the Certificate Hunters' Club in Puerto Rico, on or after year station contacted became club member. Endorsed all one band/mode or mixed. Special endorsement for having worked KP4KD at any time. Send list certified by 2 hams showing date, mode and band with $1.00 or 10 IRC fee to CHC Chapter 20, P. O. Box 10525, Caparra Heights, P. R.

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CR9AH—via W7ZAS
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FG7XL—Box 109, Pointe a Pitre, Guadeloupe.
FP8CA—via K2OJD
FU8AG—via K7GGN
HI8MMN—via WA5DAJ
HK3AMA—Box 3127, Bogota, Columbia.
HK3RQ—via W2CTN
HK9LX—via HK3LX
HL9TD—Det. B. 304 Sig Bat, APO 970, San Francisco, Calif.
JT1CA—Box 639, Ulan Bator, Mongolia.
W5BRX/KJ6—Box 130, APO 105, San Francisco, Calif.
OA3M—via Box 42, Chimbote, Peru.
OA4NKY—Juan Krakenberger, Box 2965, Lima, Peru.
OA4PO—Box 761, Lima, Peru.
PX1IK—via HB9KU
PX1OK—via HB9DX
PX1OX—via DL2OX
PX1VW—via F9VW
TI9RC—via W4ECI
W1DBN/VO2—54th Air Rescue Sqdn., Box 79, APO 677, N. Y.
VP2AB—Box 229, Antigua, B.W.I.
VP2CC/C—via W8EWS
VP2GAC—via W8EWS
VP6ZX—via W9JFJ
VP5DB—via WA2IFY
VP5LG—via K4UTE
VP7BC—via W4CNS
VP7CT—via W3LBJ
VP0GAC—via W8EWS
VS5CW—via VS1CW Box 777, Singapore.
VS9ASS—via W4ECI
VS9KDV—via W4ECI
VS9OC—Twynham Eleven, R.A.F., Masirah, B.F.P.O. 69.
XE1VT—W. Asche, Box 907, Mexico, DF, Mexico
YI2WS—via SM5CCE
YS1RGM—Box 1339, San Salvador, El Salvador.
YV5AST—Box 2285, Caracas, Ven.
YV5BKW—Box 2285, Caracas, Ven.
ZD3A—P. Scarrow, Box 285, Bathurst, Gambia.
ZD6HK—via W2ELW
ZD6OL—via G3JUL
ZM7AD—via K6ERV, Jack Brollier, Box 1772, San Mateo, Calif.
W4BPD/4W1—via W4ECI
5A5TR—Box 1525, APO 231, N. Y.
5X5IU—R. Roberts, Box 355, Kampala, Uganda.
7X2VX—via 4UWC
9A1TAI—via W4VPD
9M2GV—via W7EMU
9N1MM—via W3KVQ
9Q5CP—Emile, Box 1268, Leopoldville, Congo.

73, Urb, W2DEC

of articles on proper operating techniques, would realize that their *own* behavior on the bands could well stand improvement? It is usually, "They must mean that other guy; it couldn't be me!" Well, just this once, let's assume that the spotlight is on *you*—how do *you* measure up when it comes to the following suggestions for better operating.

1. Make sure that your own signal meets the highest standards of sideband operation—minimum suppression of at least 35 db on unwanted sideband and carrier; 2.1 to 3 kc audio bandwidth; and use of minimum power necessary to maintain contact. While it is preferable that you constantly monitor your own signal with a scope, if this is not possible, you can make use of your receiver to check your signal. You should become thoroughly familiar with the characteristics of your rig by carefully reading the equipment manual that accompanied it.

2. If you must test your signal on the air, it should be done only at times when the band is not busy and then only for not more than 10 *seconds*. If prolonged testing is necessary, it should be done with a dummy load, one of which should be in every ham's shack.

3. Master the use of vox operation. Too often, we hear operators say that they are bothered by the relay's clicking and, therefore, they resort to manual operation. This leads to unnecessarily long transmissions and makes it impossible for the conversational nature of sideband to be preserved.

4. Listen on a frequency before calling CQ or another station. If the frequency seems to be clear, take the added precaution and ask, "Is this frequency being used?" several times with pauses for replies before proceeding to operate on the frequency.

5. Don't break into a conversation unless you can hear both sides or unless you know the station well enough whom you are hearing to be sure that your interruption will be welcome. In sideband, where break-in operation is so common, it is very rude to keep calling a station who, though he may be hearing you, prefers to continue speaking to his original contact without interruption. If you are not acknowledged after one or two attempts, stand by on the frequency until the station you wish to contact is free to listen for your call.

6. Give honest reports! Whether or not you are asked for a qualitative report, take a moment to check sideband suppression, carrier suppression and audio bandwidth and clarity. Then, in a gracious and friendly manner, let the other station know if there are any improvements to be made. Many operators continue to put a poor signal on the air simply because they have not been told that there is anything wrong.

7. Speak with connected thoughts and phrases. Give the other station a chance to answer you immediately after you have made a point or asked a question. Don't force him to remember

NEW!! COMPLETE TRI-BAND NOVICE ANTENNA SYSTEM

FEATURES:

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For further information, check number 24, on page 110

B&W

TR SWITCH
(TRANSMIT/RECEIVE SWITCH)
MODEL 381B

$60.00

An electronic antenna changeover switch. Transmitter is continuously connected to antenna; antenna circuit to receiver is blocked during transmit. No switch contacts to arc or burn. Switching is instantaneous. Selectable band-switching insures no loss in receiver sensitivity. Substantial gain in receiver sensitivity results in most installations. Ideal for break-in operation on CW, SSB and AM. Bandswitch conveniently located on front. Three coax connectors are mounted on rear. Conservatively designed for full legal power. Operates from 115 volts, 60 cycles. For 52-75 ohm lines.

Size 4¾" x 4" x 5½"

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Radio Communication Equipment Since 1932
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At last! A quality microphone designed *specifically* for the ham. Features galore that hams have asked for. Tops in voice punch, intelligibility. Unique convenience features to minimize operator fatigue. Great for AM & FM, unsurpassed for SSB. • "Shaped" response—cuts off sharply above 3000, below 300 cps with rising characteristic to curve: gets message through with top audio punch! • Push-to-talk bar-switch with optional locking feature to control relay and mike muting circuits. • Separate slide-switch gives choice of press-to-talk or VOX operation. • Exclusive adjustable height stand. • Rugged Shure Controlled Magnetic element (U.S. Patent 2,454,425). • Field replaceable cartridge and cable. • ARMO-DUR case and stand—can't rust, peel, crack, or dent. Write for data sheets!

SHURE BROTHERS, INC.
222 Hartrey Ave., Evanston, Illinois

ADJUSTABLE HEIGHT

ALL NEW
SHURE
444
HAM MICROPHONE
only $25.50 amateur net

For further information, check number 26, on page 110

a lengthy, disjointed transmission or to take copious notes.

8. Avoid repetition by not repeating what the other fellow has just said. If you have heard and understood everything he has said, just say so; don't try to prove it!

Whether you are an old-timer or one whose license has recently been earned, it would be well for you to give some thought to the above suggestions to determine whether or not there is some facet of your operating technique that could be improved. None of us are perfect; all of us fall into bad habits which, with a little effort, can be corrected. It's all very well to complain about bad operating on the amateur bands and blame the other fellows. With a little improvement in everyone's operating technique, it could mean a lot more enjoyment of sideband for all. That means *you* and him and us!

Space Age Sideband

Surrounded by the space age the average citizen rarely gets to peek behind the scenes attendant to missile launchings and space probes. So too, the average ham seldom sees space-age radio at work. Thanks to the Collins Radio Co. *Signal,* we can acquaint you with a small aspect of the use of single sideband to provide reliable communications for the missile ranges and astronaut program.

The Pacific Missile Range, an agency of the Navy's Bureau of Naval Weapons, supports missile and satellite programs from the Army, Navy, Air Force, Marine Corps, NASA and other government agencies. Of particular interest to sidebanders is the extensive use of s.s.b. for communication. In the air with the "Willie Victor's," big, extensively equipped and specially designed *Constellations* carrying kilowatt s.s.b. equipment, to extensively equipped receiving buildings, s.s.b. is making a substantial contribution to the space effort.

PMR makes its headquarters at Point Mugu, California and operates sites at various places in the far flung islands of the Pacific to provide a vast network of data and information. It is not unusual to monitor a radio conversation from Point Mugu which originates with the launch control officer at a Vandenberg missile blockhouse, travels 150 miles south via cable and microwave relay to Laguna Peak, continues by s.s.b. from the peak to a site several thousands of miles downrange and then returns via the same route back to the receiver building. The impression received is one of listening to an intercom in the same building. In fact, personnel at the Laguna Peak facility have established and maintained 100% contact with a "Willie Victor" sitting on the runway of an airfield near Manila in the Philippines.

We fully well realize that to s.s.b. operators this is no real reason for raised eyebrows—we do it all the time. Now all we need do is convince NASA that they include an s.s.b. transceiver in the next space capsule.

73, Dorothy & Irv

UHF [*from page 61*]

local oscillator to make tuning less critical.

The antenna at W6DNG is a sight to behold. It consists of three home-brew long yagis phased 120° apart with the elements forming three spokes in a circle. By proper phasing this array produces the circular polarization required for moonbounce work.

The antenna at OH1NL's QTH in Nikkila is shown in the photograph. Len uses 2 × 26 elements for transmitting and 6 × 12 dipoles, series coupled, for receiving.

Bill recently acquired a Pacific Semiconductors Hi-*Q* Varicap® for use in a new parametric amplifier. This should permit him to break through bigger and better v.h.f. frontiers.

DX—Although it's rather old news, by now, flatland easterners may be interested in scatter tests between Northern and Southern California.

The ham club at Stanford (W6YX) in Palo Alto has been successful in working many stations in the bottom end of the state. W6PJA, W6NGX, WA6MLX, K6HMS, W6NLZ, K6LZC are among the many hams successful in punching a signal through into Northern California. Considering the obstacles, this feat is comparable to working Florida, on two meters, from Maine without the aid of a band opening.

That circularly polarizes us for another 30.

For now, 73, DE W6TNS

il Lulu [*from page 37*]

tained with 117 volts a.c. power. A minimum of 13 volts d.c. was needed. In most cases mobile operation is conducted while the car motor is running, so the supply potential will be at least 13 volts from the battery charging system and peak performance can then be realized.

Lil Lulu is "well built" with heavy gauge material and she uses the highest-quality components for her makeup. She cuts a neat figure in a satin-finished aluminum panel with black knobs and lettering. Her fickleness is easy to see on the nicely lit v.f.o. dial with calibrations every 100 kc from 50 to 54 mc. She is clothed in a sturdy perforated dark gray case. Dimensions?— 5⅜" H × 8" W × 9⅞" D. Weight?— 16 lbs. Lil Lulu can be had with a one-year warranty for $225, complete with a.c. and d.c. power cables, from Whippany Laboratories, Inc., 1275 Bloomfield Ave., West Caldwell, N.J.

—W2AEF

Space [*from page 51*]

now underway in an effort to raise gain, drop the primary power requirement still further, and decrease intermodulation distortion. While these problems are complex, progress is being made, but it now appears that a 1963 launch date may be too optimistic unless a "breakthrough" is made in the design of the transistorized linear amplifier, or the power supply. As it now stands, the package is designed to function with either a "one shot" battery supply (with an approximate

TEST EQUIPMENT

GUARANTEED GOOD CONDITION

SIGNAL GENERATOR, URM-25, 10K.C.-50 M.C.		$195.00
SIGNAL GENERATOR, URM-26B, 5-405 M.C.		250.00
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SCOPE, Tektronix #511		175.00
SCOPE, Tektronix #511 AD. with delay line		250.00
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SIGNAL GENERATOR, Ferris 18C		45.00
FREQ. METER	Navy LM	49.00
	115V. supply	15.00
SIGNAL GENERATOR, Triplett 3433, FM/AM, 100KC-120MC		69.00
MARCONI 148-017 Master Oscillator, 2-4 MC fundamental, very high harmonics		75.00
RECORDER, Leeds & Northrup, 50 Milli volt		95.00
V.T.V.M., for A.C., Ballantine 300		59.00
SIGNAL GENERATOR, General Radio LR		95.00
SIGNAL GENERATOR, General Radio 605 PL		95.00
IMPEDANCE BRIDGE, General Radio 650A		125.00

TRANSMITTERS & RECEIVERS

GUARANTEED GOOD CONDITION

COSMOPHONE #35, with power supply, like new	$325.00		
ELDICO SSB-500, 500 Watt linear amplifier	175.00		
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DX-40 & VFO	65.00	GLOBE CHIEF DELUXE	49.00
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SPECIAL: 4-400A tube, socket, chimney & Fil. transformer, all are new **$49.95**

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COLLINS mechanical filter, F-455-D-3L, New	$35.00
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TCS Xmitter	35.00
TCS receiver	35.00
ART-13 Xmitter, a very good buy	49.00
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TBS Receiver, 60-80 MC. for 6 Mtr.	19.00
VARIACS—10 Amp. $14.00; 18 Amp.	24.00
WILCOX receivers, F-3 or CW-3	15.00
RG-8 Coax Cable, new, 100 ft.	6.75

All prices F.O.B. Hempstead.
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25% with C.O.D. orders.

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For further information, check number 27, on page 110

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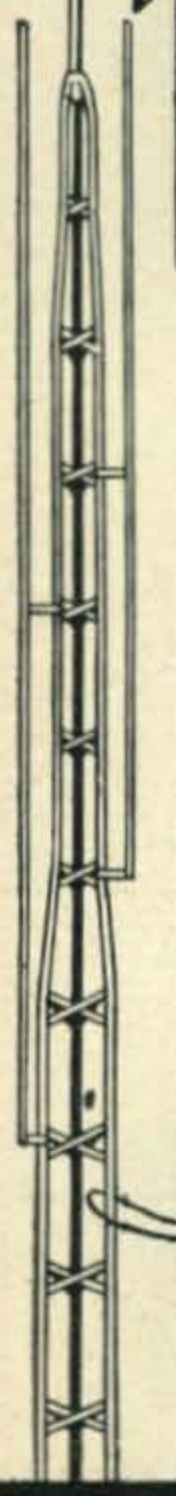
24' 2"



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Dept. CQ963, 1211 LaSalle, Minneapolis 3, Minn.

For further information, check number 28, on page 110

life of 3-4 weeks), or with a combination of battery and solar charging cells for extended life. A final decision will be made shortly on the choice of power supply to be used. More information on this subject will appear in this column as soon as the situation clears.

OSCAR Communication Network

Bob Walton, W6CYL, has taken charge of the communication facilities for Project Oscar. At this time, it is planned to transmit OSCARgrams on 80, 40 and 20 meter RTTY, on 80, 40 and 20 meter s.s.b., and on 160 and 2 meter a.m. Arrangements have been made to have the OSCARgrams relayed through the International Telecommunication Union Radio Club station 4U1ITU in Geneva, Switzerland. Direct transmissions will also be made from OSCAR Control station W6EE to I.A.R.U. member societies for relay in other areas of the world. The communication network is in the early stage of development at the present time, and stations desiring to participate in the network can receive further information direct from Bob Walton at Project OSCAR headquarters.

OSCAR Smithsonian Display

On August 31, 1963, a model of the OSCAR I beacon satellite will be presented formally to the Smithsonian Institution in Washington, D.C., for inclusion in the Institution's space flight exhibit. If you visit Washington for the ARRL Atlantic Division Convention, be sure to plan to attend the Smithsonian ceremonies. As far as can be determined at press time, OSCAR will be the first piece of radio amateur equipment to be included in a Smithsonian exhibit, and it will be standing alongside John Glenn's capsule and other history making American space relics!

73, George, W3ASK

Ham Clinic [*from page 67*]

have their own high flying Telestar type satellite for 2 and 6 meters; and the President of the U.S. will be a ham operator. Enough? ? ?

DX-40 Prize—The DX-40 offered as a prize by HAM CLINIC has been awarded to Brother Mike Gill, Maryglade Seminary, Memphis, Michigan. If any of you fellows have some spare equipment around which you would like to donate to a good cause, send it to Brother Gill. The missionary students can surely use it—especially if we are fortunate enough to receive reciprocal operating privileges.

Servo Rotators—"Where can I get some information on servo rotators?"

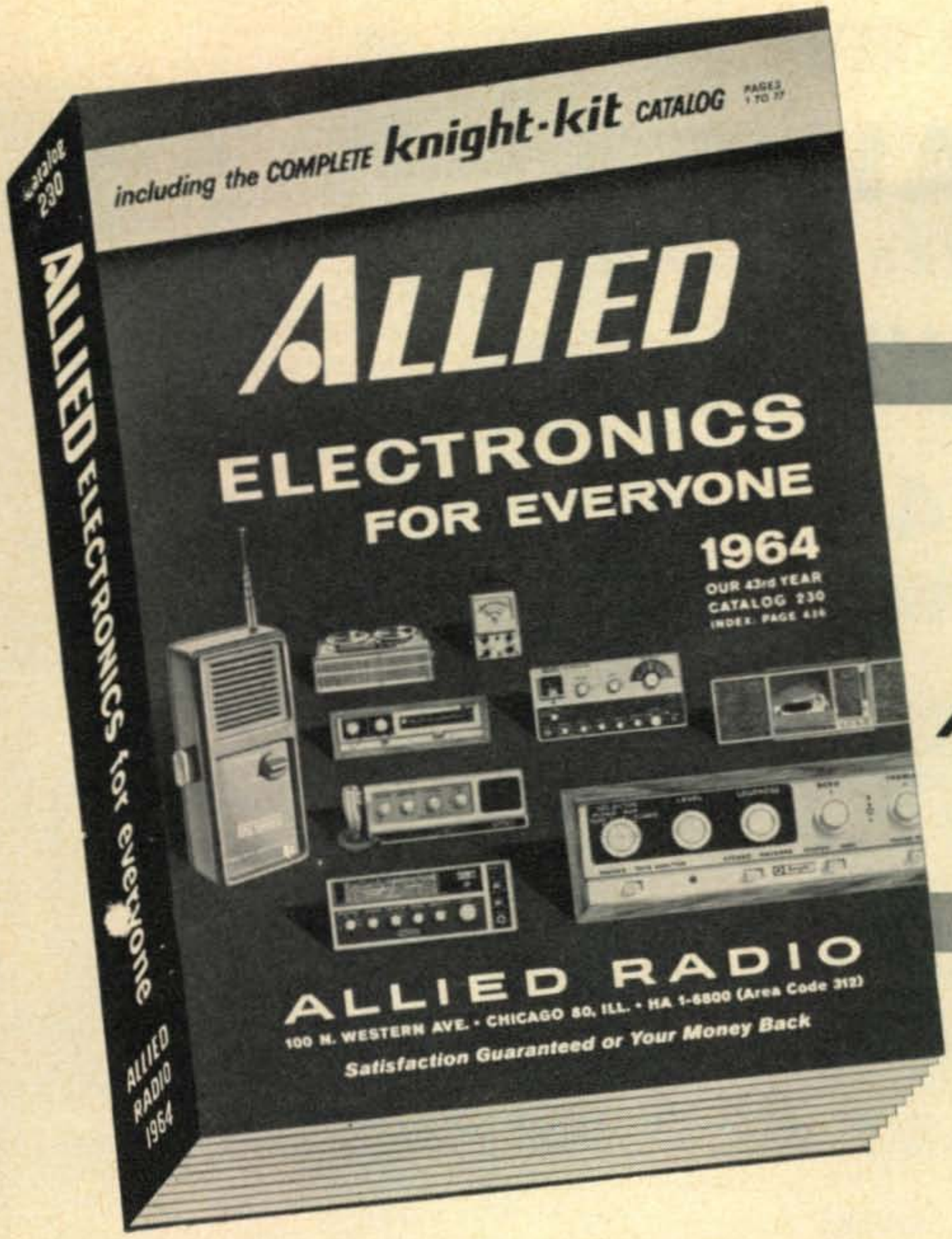
Try *CQ* for November 1953.

More Modulation for TBS-50—"In what issue was there information on increasing the modulation for my Harvey Wells TBS-50?"

Look at the October 1955 *CQ*.

SX-71 Improvement—"Any late information on improving the SX-71 receiver?"

No, but see the September 1954 issue of *CQ* for some good info.



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AF-67 to 6 Meters—"In what issue was the article on putting the AF-67 transmitter on 6 meters?"

See the October 1958 *CQ*.

Gonset 10-11 to 6 Meters—"Will you please tell me how I can convert my Gonset 10-11 meter converter for 6 meter operation?"

See the November 1958 issue of *CQ*.

SX-99 Intermittent—"I have a good old workhorse SX-99 receiver, but during the last couple of weeks it would be operating and then suddenly quit. Flipping the ON-OFF switch will return it to operation. Any clues to what may be causing the trouble?"

Sure. First check the interstage coupling capacitor C_{32} (270 mmf between V_2 and V_3. Next check C_{45} (.022 mf) between V_5 and V_6. You can generally tell which capacitor is "acting up" by touching the grid terminal of the tube it feeds. Touching the terminal will "shock" the stage into operation, *i.e.*, make the capacitor again operative. I hope you have checked all the tubes on a good *gm* tube tester.

HQ-170 S-Meter—"I cannot seem to zero the S-meter in my HQ-170. What should I look for?"

First check V_{13B} (12AU7). Next check R_{20} (ZERO ADJUST) for a short. Check R_{22} and R_{88} for changed resistance. These resistors are 5% units.

KWM-2—"I have an early used model Collins KWM-2 transceiver. How can I obtain improvement of the correlation between frequencies on the different bands?"

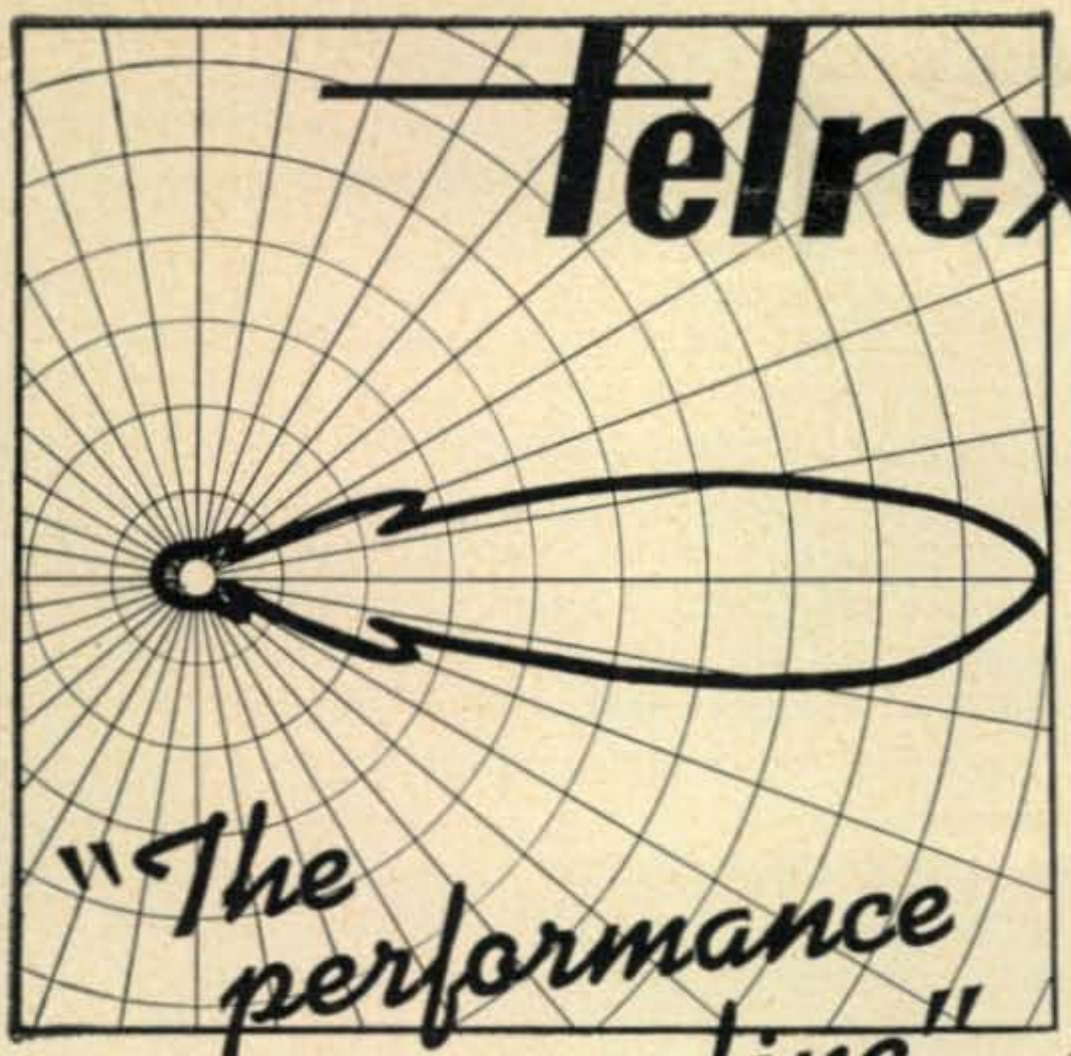
By adding a 27 mmf capacitor to the grid circuit of the h.f. oscillator tube V_{13}. This will result in less need for p.t.o. zero hairline adjustment when switching between bands. Install the capacitor between V_{13}, pin 2 and the center shield of V_{13}. This modification does not apply to the later KWM-2 or KWM-2A units. Collins Bulletin No. 3, dated July 12, 1960 applies.

Thirty

Thus far in our stay here in Europe, we have seen most European countries and have traveled to parts of Africa (Congo, Liberia, Ghana and Morocco). Wherever we went we always met someone who read *CQ* and of course our column, HAM CLINIC. Every ham contacted agreed that reciprocal operating privileges with the United States would be a wonderful thing. If Bill S-920 is not passed when this is printed, do write your congressman requesting that he endorse it. Its passage can only create much international good will and improve radio communications technology the world over. Don't you have just five minutes and a postcard? You'll truly be helping the thousands of Americans overseas who can now only listen. And of course, you'll be helping yourself—for perhaps one day you will be fortunate enough to take a vacation and visit strange lands. It would be nice for you to be able to talk to the folks back home and make friends with the people of the country which you are visiting.

For this month then, 73, 75, and 72 to hams everywhere.

Chuck



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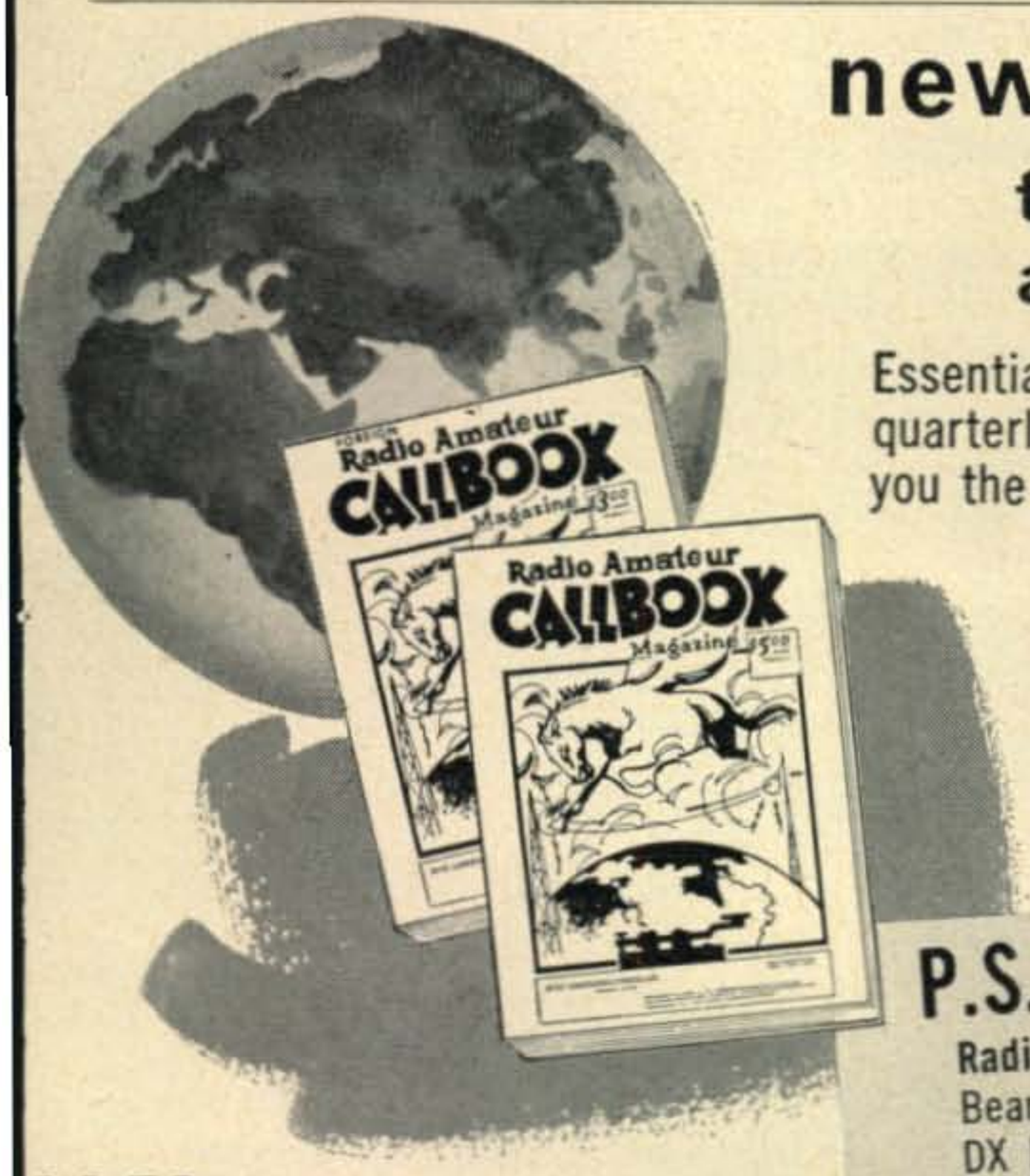

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Novice [*from page 59*]

son Chapter No. 1. Ralph was the first handicapped member to get his license with the aid of the club. His call is K8PUS.

The Ragchewers meet at 3:00 P.M. the first Sunday of every month at Lakewood House. They would be glad to help any group in forming a club to aid their local handicapped. This surely would be an interesting club to visit if you are in the area at the time of their meeting.

We have no "Help Wanted" aspirants or net announcements for this month. If I can be of help to you through this column let me know and send your news and pictures to me, Walter G. Burdine, W8ZCV R.F.D. 3, Waynesville, Ohio, 45068. That's about all for this month except to wish you good DX and plenty of long ragchews on the air and at your local hamfests. See you there. 73, Walt, W8ZCV

RTTY [*from page 69*]

Adjustment

Tune-up of the n.f.s.k. TU is not difficult if you have a fairly accurate source of test tones. The most practical way to do this is to set up Phil's a.f.s.k. oscillator (RTTY Column, *CQ* Mar., May '62) for 2040 cycles *mark* and 2210 cycles *space*. Another oscillator, set up for 2125 cycles, is required to begin. Remove Q_3 and feed in 2125. L_1 is peaked by adjusting either the number of turns or by the capacitance of C_1, which should be about 0.066 mf. Put Q_3 back in and, with L_3 disconnected, peak L_2/L_5. Resonance is observed with either a v.t.v.m. or a 'scope connected across the coil being tuned. Next, remove Q_4 and Q_5 and put the 500K pot at electrical zero. With the v.t.v.m. across the pot, tune L_3 for zero volts. C_3 ends up around 0.066 mf. Now, with a 'scope acros the L_2/L_5 combination and the v.t.v.m. across the 500K pot, vary the input frequency above and below resonance. There should be two peaks approximately 85 cycles above and below resonance, which should occur at 2125 cycles. If the above conditions are not achieved, retrim C_2 and C_3 for best balance at peaks and cross-over at center frequency.

With Q_4 and Q_5 plugged in, short the input and check the reading of the meter in the collector circuit of Q_6 and Q_7. If the meter does not read zero, juggle the output transistors to get balance. Do *not* play with the pot to do this. Now, put in a weak signal, just below limiting. first *mark* (2040) then *space* (2210). Adjust the 500K pot to get the same reading on the meter. Another way of doing this is to feed in the a.f.s.k. oscillator keyed by the dot generator and to set the pot then for zero meter reading.

Operation

As we said, a positive tuning indicator is a necessity. Recommended is the phase-shift 'scope type (*The New RTTY Handbook*, page 149, but set up for 2125 cycle center. Also necessary

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For further information, check number 47, on page 110

is a band-pass input filter to keep the limiters from providing interferring signals from beat notes at ½, ⅓, ¼, *etc.* of the signal beat notes. The TU saturates at 0.07 volts r.m.s. When fully saturated, up to 300 cycles can be accepted. Cross-over is 40 cycles, well below minimum. By the way, make sure you set the receiver b.f.o. 2125 cycles off the i.f. center instead of 2550 (*The New RTTY Handbook,* pages 137 and 138).

Comments

Next month we will try to bring you the dope on Phil's band-pass input filter and some information on circuit values for the a.f.s.k. oscillator on n.f.s.k. Stay tuned in, will you?

73, Byron, W2JTP

YL [*from page 65*]

with wonderful memories, she has much praise for the International Ham Hop Club. She says it is especially well organized in England (where it began) and in Sweden, and adds, "Truly those Swedes were so hospitable that when we got to Germany we didn't contact IHHC because thought if they were as hospitable as the Swedes we'd never get out of Germany!" (She did visit DL3LS, Ursula, however.)

IHHC, or North American Ham Hop Assn. as it is called here, is an organization devoted to making international travel and visits among hams of the world easier and more economical. When one contacts the hospitality organizer in a country he finds where you want to go and contacts hams in each town who arrange to meet you, keep you in their homes, *etc.* North American officers are: President, W4WHN; hospitality organizer, W9AMF; P/C, W9YZE; treasurer, W8SZF; North American representative, W6THN/1.

Flo feels that if DX hams could get in on Greyhound's "99 dollars for 99 days" bus tours, and could arrange to stay overnight with hams along the way, we'd have a lot of DX visitors and create a wonderful bit of international good will, and provide a truer understanding of the United States.

LCL Certificate

New certificate custodian for the Loaded Clothes Line YL Net is Helen Drake, K5ECP, 1717 Virginia St. N.E., Albuquerque, N.M.

1964 YL Funfest

The Camellia Capital Chirps are deep in plans for the 1964 All Calif. YL Funfest. Dates are March 6-7, 1964 and will coincide with the Camellia Festival in Sacramento (March 6-15). K6ENK is prize chairman. She would like your help on a unique prize—a recipe box file with autographed recipes. Put your favorite recipes on 3 × 5 cards, sign them, and mail to Wanda Gluck, 8847 Pershing Ave., Orangevale, Calif. Be sure to use 3 × 5 cards so they can go directly into the file box.

33, W5RZJ

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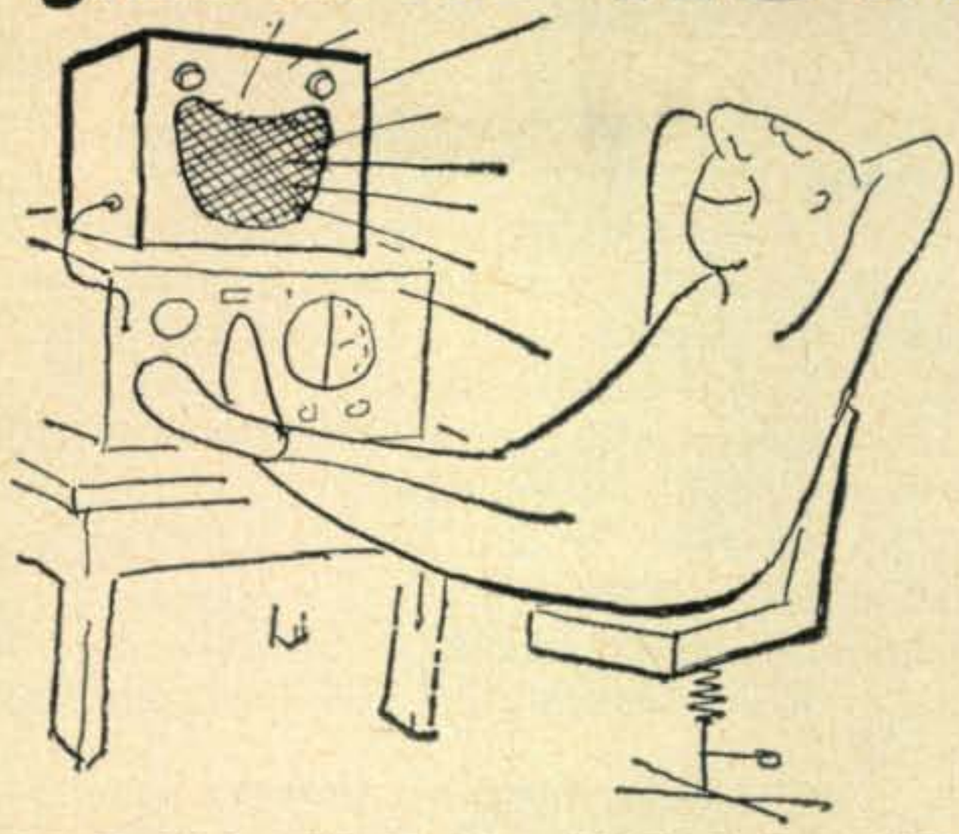

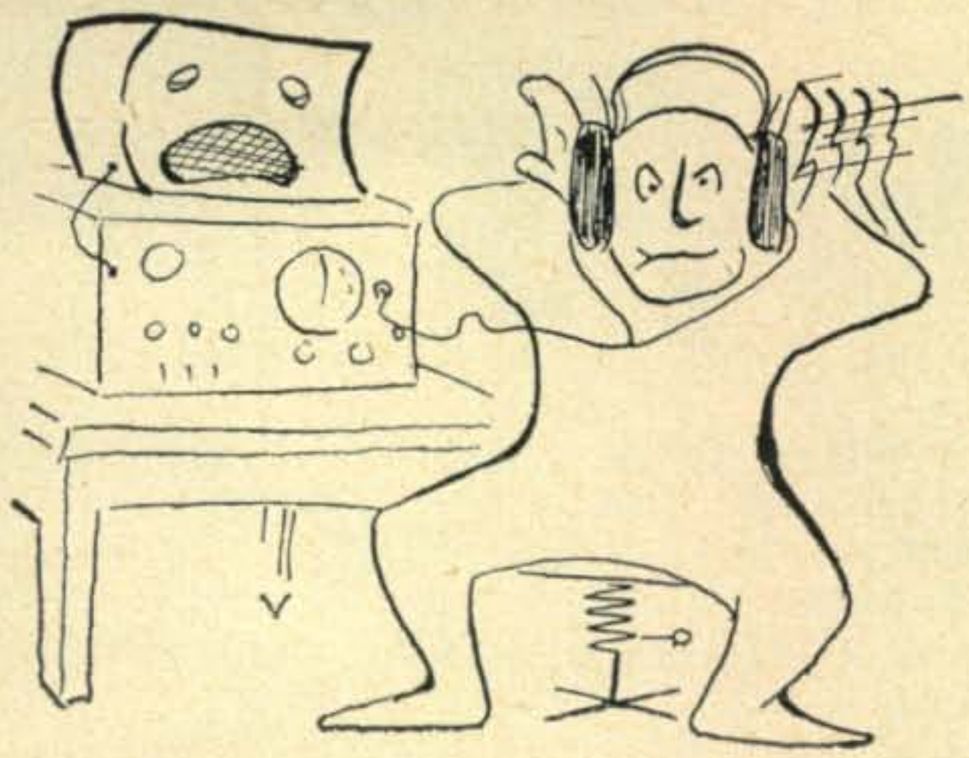

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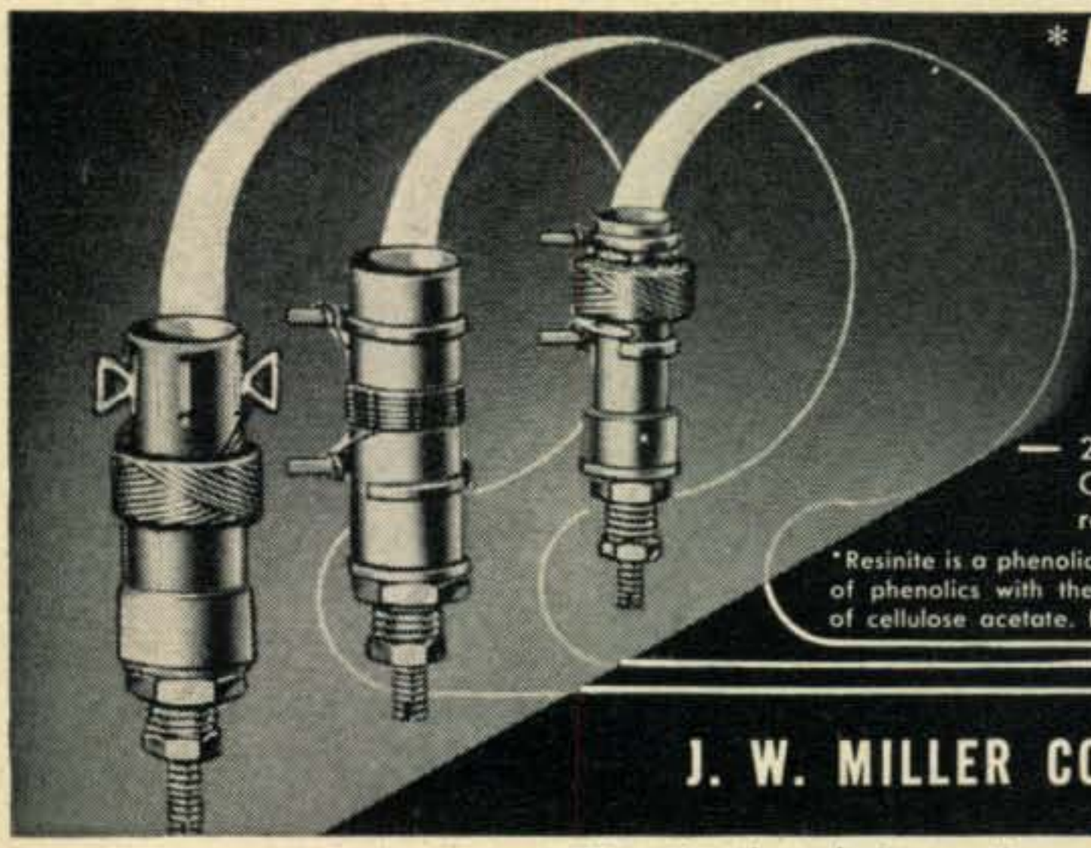

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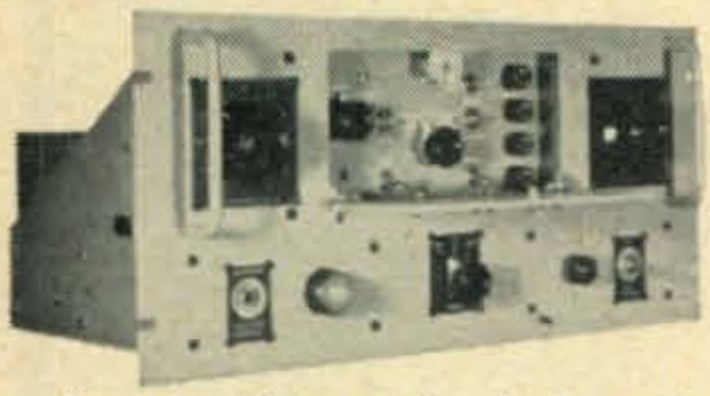

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PE-73 D.C. Source [*from page 84*]

ing to hold the output voltage constant.

The converted unit makes a nice battery charger for extra batteries used for mobile servicing, by running it with an electric motor. Another real handy use is for field day—the unit can be attached to a gas engine and used to charge six, twelve, or twenty-four volt batteries just by adjusting the voltage control.

This generator provides a cheap supply of d.c. at high current, in addition to providing a use for one of those 28 volt dynamotors you've got kicking around. Next time you need lots of amps of low voltage d.c., think of this and take a few hours off to build yourself this handy generator.

D.C. Machine Theory

. For those who would like to improve their understanding of the operation and conversion of this generator, presented here is a review of some basic d.c. machine theory.

We are only concerned with the low voltage part of the dynamotor, so let us consider this portion alone from a linear equivalent circuit point of view. The d.c. motor may then be represented as shown in fig. 3:

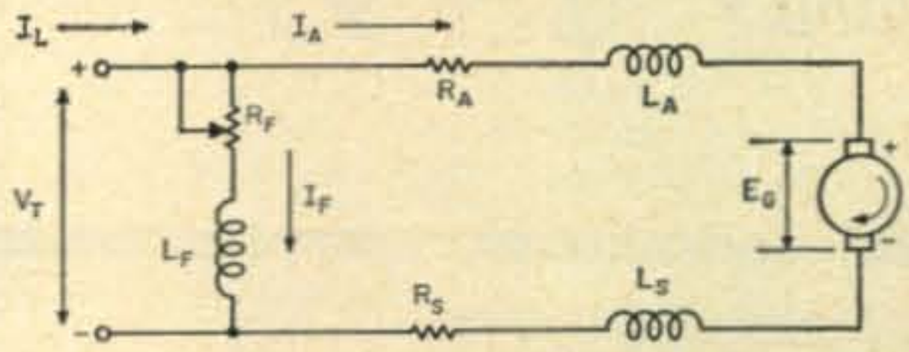

Fig. 3—Equivalent circuit of the motor.

where V_T is the applied voltage, I_L is the current drawn from the line, R_F is the shunt field resistance, L_F is the shunt field inductance, I_F is the shunt field current, I_A is the armature current, R_A and L_A are the armature resistance and inductance, R_S and L_S are the series field resistance and inductance, and E_G is the back voltage generated by the moving armature. The only element requiring further comment is E_G, which represents the armature reaction. This is an opposing voltage generated by the armature windings moving thru the magnetic field produced by the field coils. The E_G accounts for the bulk of the voltage drop within the motor, and is only slightly less than V_T. This generated voltage is proportional to the motor speed N, the shunt field current I_F, and the armature current I_A, related by the constants K_1 and K_2.

We shall now analyze the circuit to see the motor speed dependence on the circuit paramenters.

Since we are working with d.c. and are only concerned with steady state behavior, the inductances do not enter the calculations. From the circuit we see that:

$$I_L = I_F + I_A$$

$$I_F = \frac{V_T}{R_F}$$

$$V_T = E_G + I_A (R_A + R_S)$$

$$E_G = K_1 N [I_F + K_2 I_A]$$

Combining these equations we obtain:

$$N = \frac{V_T - I_A (R_A + R_S)}{K_1 [I_F + K_2 I_A]} = \frac{V_T - I_A (R_A + R_S)}{K_1 \left[\frac{V_T}{R_F} + K_2 I_A\right]}$$

From a look at this equation we see that the motor speed, N, may be easily controlled by changing R_F; increasing R_F increases the motor speed. We will see this to be exactly opposite of the voltage output control exercised by R_F in d.c. generator operation.

If we now turn the armature in the same direction by some external means, our d.c. machine becomes a generator. The same equivalent circuit holds except for the form of the input and output powers, and the current directions. In motor operation we put in electrical power and derive mechanical power; in generator operation the powers are reversed. Also, for generator operation, the direction of the line current I_L and the armature current I_A reverse.

The equivalent circuit is now as shown in fig. 4.

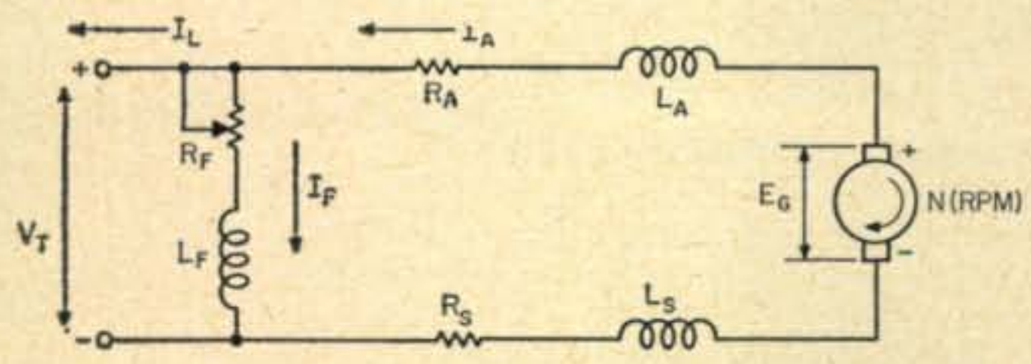

Fig. 4—Equivalent circuit of the generator.

Following a similar analysis and solving for the electrical output of the generator, we see that:

$$V_T = K_1 N I_F + I_A [K_1 K_2 N - (R_A + R_S)]$$

and

$$I_F = \frac{V_T}{R_F}$$

These equations say that, for constant driving speed N, the output voltage may be varied by changing the field current I_F, which is varied by changing R_F. We also see that the output voltage is inversely proportional to R_F; just the opposite of the motor speed control by R_F. Another observation from these equations is that if $(R_A + R_S)$ is appreciable, then the output voltage will drop as increasing load current (I_L) is drawn. However, if $(K_1 K_2 N) = (R_A + R_S)$, then the output voltage is independent of the load current drawn. This condition represents what is known as "flat compounding"; when the action of the series field compensates for the voltage drop within the generator to maintain the output voltage constant.

Now that we understand the operation of the d.c. machine from a circuit standpoint, we are in a better position to appreciate the operation of the PE-73. ■

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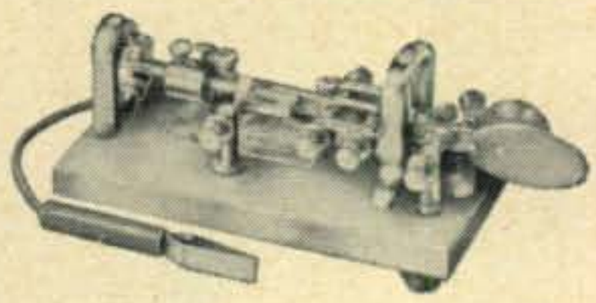

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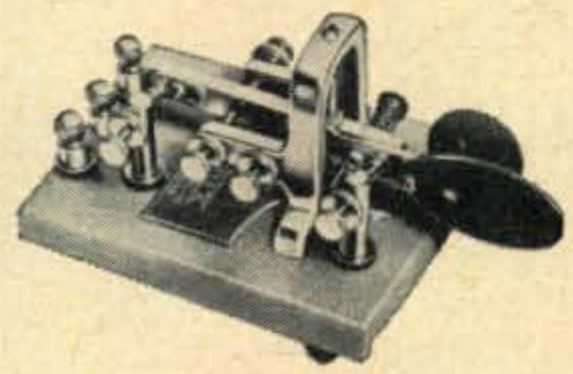

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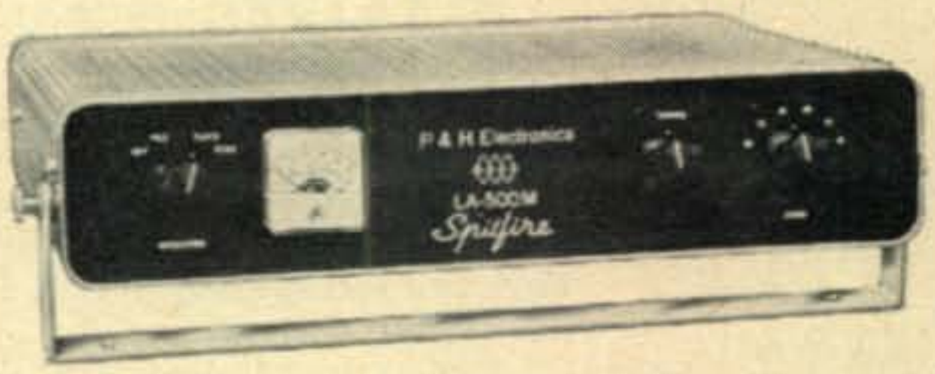

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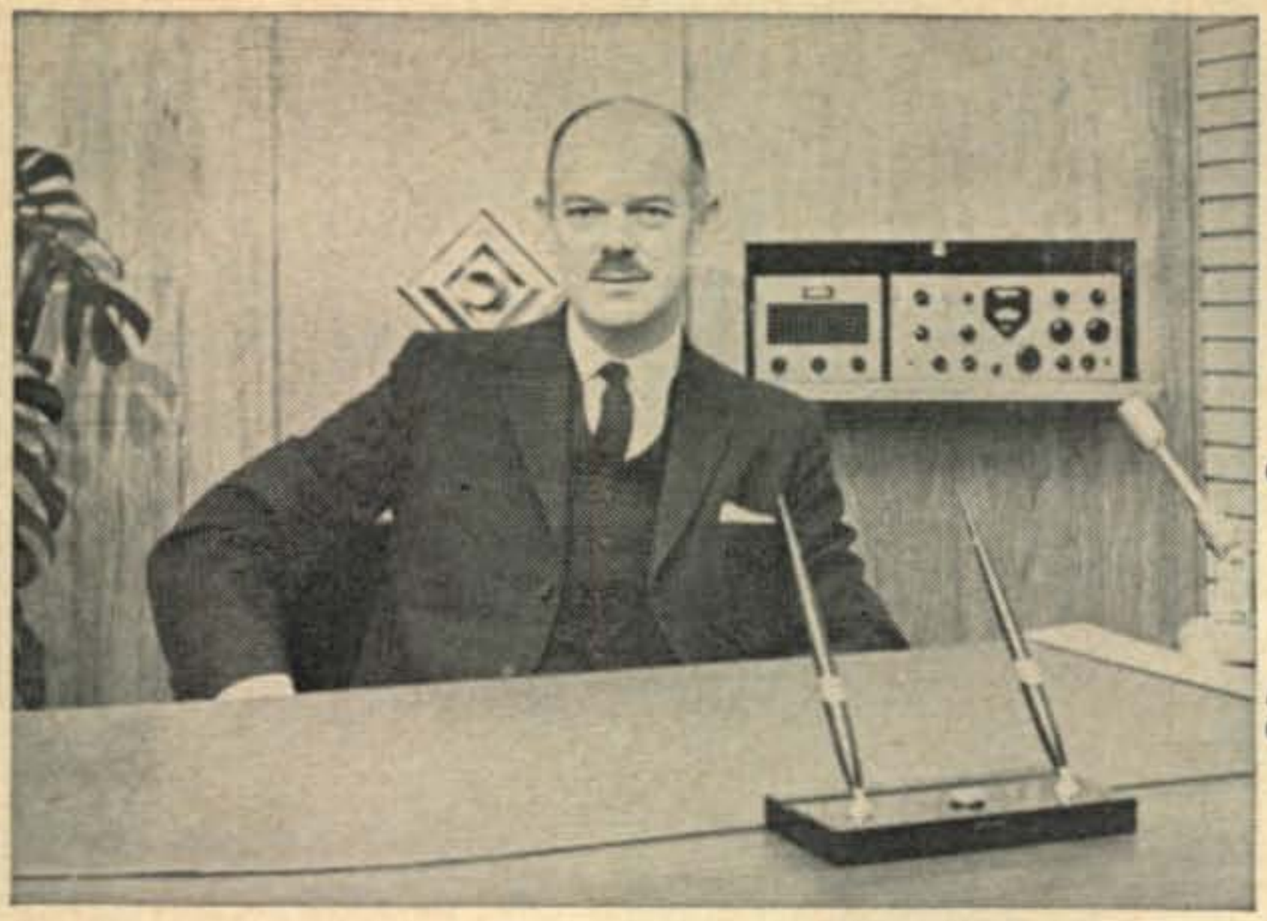
FOR SALE Good, clean HT-37 that I'd like to sell for $325.00. Write: Bob Heil, K9EID, 402 Border St., Marissa, Ill.

FOR SALE Ameco TX-86 transmitter, 60 watts, 80 thru 6 meters. Perfect condition with power supply, $99. Also Tecraft 2 meter transmitter, new tubes, 20 watts, 2 Novice band crystals, with power supply. Perfect condition, $79. Write: Ron Brown, WB2AOG, 513 Linden Avenue, Rahway, New Jersey.

WANTED Collins 51J-2,3,4, R-388, R-390, R-390A, R-391, 41S-1 Teletype, test equipment. Cash or trade for new amateur equipment. Sell: 200V $649; Ranger $159; 75A2A $269; URA8A Comparator $95; FRR-23 low freq. receiver $245; Boehme Automatic cw keyer $125; cw tape perforator $175. Alltronics Howard Co., Box 19, Boston 1, Mass. (Richmond 2-0048).

SELLING Collins 51J3 receiver, excel. condx., best offer over $400, Hallicrafters SR-34 6&2 meter xcvr $200 firm, Gonset 6/2/220 VFO $25. Box #TK2, CQ, 300 West 43rd St., N.Y. 36 N.Y.



It takes a banker to know a good buy

. . . Collins

S S B EQUIPMENT . . .

and it takes Terry, W9DIA

to come up with a LOW LOW 5% CARRYING CHARGE

"Hi! I'm Lowell McNeil, W9PTN, president of the West Racine Bank in Racine, Wisconsin. As a banker, I can assure you that Collins radio equipment is an excellent investment. It has quality, performance and top trade-in value. These are the things we bankers look for. Many banks offer special finance rates on Collins equipment, just as Terry is offering here. I have KWM-1 at the office and a complete Collins station at home. I've been 'all-Collins' for many years."

LOW AS 10% DOWN PAYMENT — TAKE 1-2-3 YEARS TO PAY!

	Amateur Net	(1 yr.) (10% Down)	(2 yrs.) (20% Down)	(3 yrs.) (30% Down)
30L-1 Linear Amplifier	$ 520.00	$ 40.95	$ 19.06	$ 11.62
30S-1 Linear Amplifier	1556.00	122.53	57.05	34.79
32S-3 Transmitter	750.00	59.06	27.50	15.81
62S-1 VHF Converter	895.00	70.48	32.81	20.01
75S-3 Receiver	680.00	53.55	24.93	15.20
75S-3A Receiver	750.00	59.06	27.50	15.81
KWM-2 Transceiver	1150.00	90.56	42.16	25.71
KWM-2A Transceiver	1250.00	98.43	45.83	27.95
51J-4 Receiver	1464.00	115.29	53.68	32.73
51S-1 Receiver	1828.00	143.95	67.02	40.87
351D-2 Mobile Mount	120.00	9.45	4.40	2.68
MP-1 14V DC Power Supply	198.00	15.59	7.26	4.42
PM-2 Portable Power Supply	150.00	11.81	5.50	3.33
CC-2 Carrying Case	85.00	6.69	2.99	1.90
CC-3 Carrying Case	107.00	8.42	3.92	2.28
516F-2 AC Power Supply	115.00	9.05	4.21	2.57
312B-4 Speaker Console	195.00	15.35	7.15	4.36
312B-5 PTO Console	350.00	27.56	12.83	7.82
399C-1 PTO Speaker	164.00	12.91	6.01	3.66

THIS LOW 5% FINANCE RATE APPLIES ONLY TO NEW COLLINS EQUIPMENT PURCHASED WITHOUT TRADE IN

Only Terry Offers Low 5% CARRYING CHARGE

AMATEUR ELECTRONIC SUPPLY

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Phone WEst 3-3262

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6450 Milwaukee Ave.,
Phone RO 3-1030

ORLANDO, FLORIDA
23 Azalea Park
Shopping Center
Phone 277-8231

IMPORTANT: Send all mail orders and inquiries to:
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3832 W. Lisbon Ave., Milwaukee 8, Wisconsin

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I enclose ..... I will pay the balance

☐ 1 Year (10% Down) ☐ 2 years (20% Down) ☐ 3 years (30% Down)

This special low 5% interest rate subject to withdrawal without notice.

Name .....

Address .....

City ..... Zone ..... State .....

☐ Send latest reconditioned equipment bulletin.

For further information, check number 48, on page 110

DOW-KEY DK60 SERIES

4 VERSATILE MODELS A.C. or D.C.

COAXIAL RELAYS

Also Available with Type C, TNC, BNC, N & UHF Connectors

Outstanding favorite for amateurs . . . Versatile combinations for industrials! Low VSWR — less than 1.15:1 from 0 to 500 mc. LOW LOSSES . . . High Contact Pressures. LOW CROSS-TALK through use of patented "isolated connector" arrangement. HIGH POWER RATING. All coils encapsuled in epoxy resin for quieter operation and resistance to moisture.

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- ★ **See one of our 700 dealers and distributors in U. S. and Canada for catalog sheets or write:**
- ★ Weatherproof models available at slightly higher cost.
- ★ Ganged, multiple position switch arrangement available for remote control selection of antennas.

STANDARD RELAYS: DK60, DK60-G, DK60-2C and DK60-G2C —

PRICED FROM $12.45

DOW-KEY COMPANY
Thief River Falls, Minnesota

For further information, check number 56, on page 110

TRANSISTOR IGNITION

Improves gas mileage and acceleration. Extends plug and point life. Complete kit including integrated heat sink, 3 top brand transistors, and top quality components for rapid assembly. Instructions included. 1 Year guarantee.

Complete kit—only $14.95 **Wired & Tested $19.95**

Postpaid U.S.A.

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CQ Magazine, Dept. RS

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Void after
Sept. 28, 1963

Please send me more information on your ads in the Sept. 1963 *CQ* keyed as follows:

1	2	3	4	5	6	7	8	9	10	A
11	12	13	14	15	16	17	18	19	20	B
21	22	23	24	25	26	27	28	29	30	C
31	32	33	34	35	36	37	38	39	40	D
41	42	43	44	45	46	47	48	49	50	E
51	52	53	54	55	56	57	58	59	60	

Total Inquiries ☐

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(Please Print)

Type of work (specify)_____

ADDRESS_____

CITY_____

ZONE____ STATE_____

advertisers index

A & F Electro Mart 110
Algeradio Electronics Company 95
Allied Radio 97
Amateur Electronic Supply 82, 88, 89, 98, 104, 106, 109, 111
American Crystal Company 88
Antenna Specialists Company 10

Barker & Williamson, Inc. 93
Barry Electronics 92
Bomar Crystal Company 91
Bonn, Lew Company 96, 100

Clegg Laboratories 80
Cleveland Institute of Electronics 8
Collins Radio Company ..... Cover II
Communications Equipment Co. 90
Communication Products Company, Inc. 4

Dow-Key Company 108, 110

EICO Electronic Insti. Co., Inc. 18
E-Z Way Towers, Inc. 90, 106
Electronic Circuits Handbook 86
Evans Radio 91

Fair Radio Sales 107
Finney Company, The 83

Gonset Inc. 70

H & H Electronic Supply, Inc. 105
Hallicrafters Company 2
Hammarlund Manufacturing Company 13
Ham Mart 87
Ham Trader, The 105
Harvey Radio Company, Inc. 85
Heath Company 11
Hy-Gain Antenna Products Corporation 17

Instructograph Company 90
International Crystal Mfg. Co., Inc. 5

Johnson, E. F. Company 15

Lafayette Radio 112
Lampkin Laboratories, Incorporated 99
Lawrence Engineering Co. 83

Master Mobile Mounts, Inc. 21
Mid-West Electronic Supply 99
Millen, James Mfg. Co., Inc. 12
Miller, J. W. Co. 103
Mosley Electronics, Inc. 19

National Radio Company, Incorporated ..... Cover III
New Products 103
New-Tronics Corporation 9

P & H Electronics 107
Parks Electronics 83
Penta Laboratories, Inc. 20
Petersen Radio Co., Inc. 1
Premax Products 91

Radio Amateur Call Book 88, 99
RCA Electric Components and Devices ..... Cover IV
Raytronics 103
Reed, Ron Electronics 103
Rohn Manufacturing Company 108

Shure 94
Subscription 102
Supreme Electronics, Inc. 81
Swan Electronics Corp. 6
Syracuse V.H.F. Club 73

Telemethods International 104
Telrex, Laboratories 99
Tri-Ex Tower Corp. 10, 93
Turner Microphone Co. 16

Vibroplex Co., Inc. 105

Western Radio Co. 103
Whippany Laboratories, Inc. 79
WRL, World Radio Labs, Inc. 14, 84, 101

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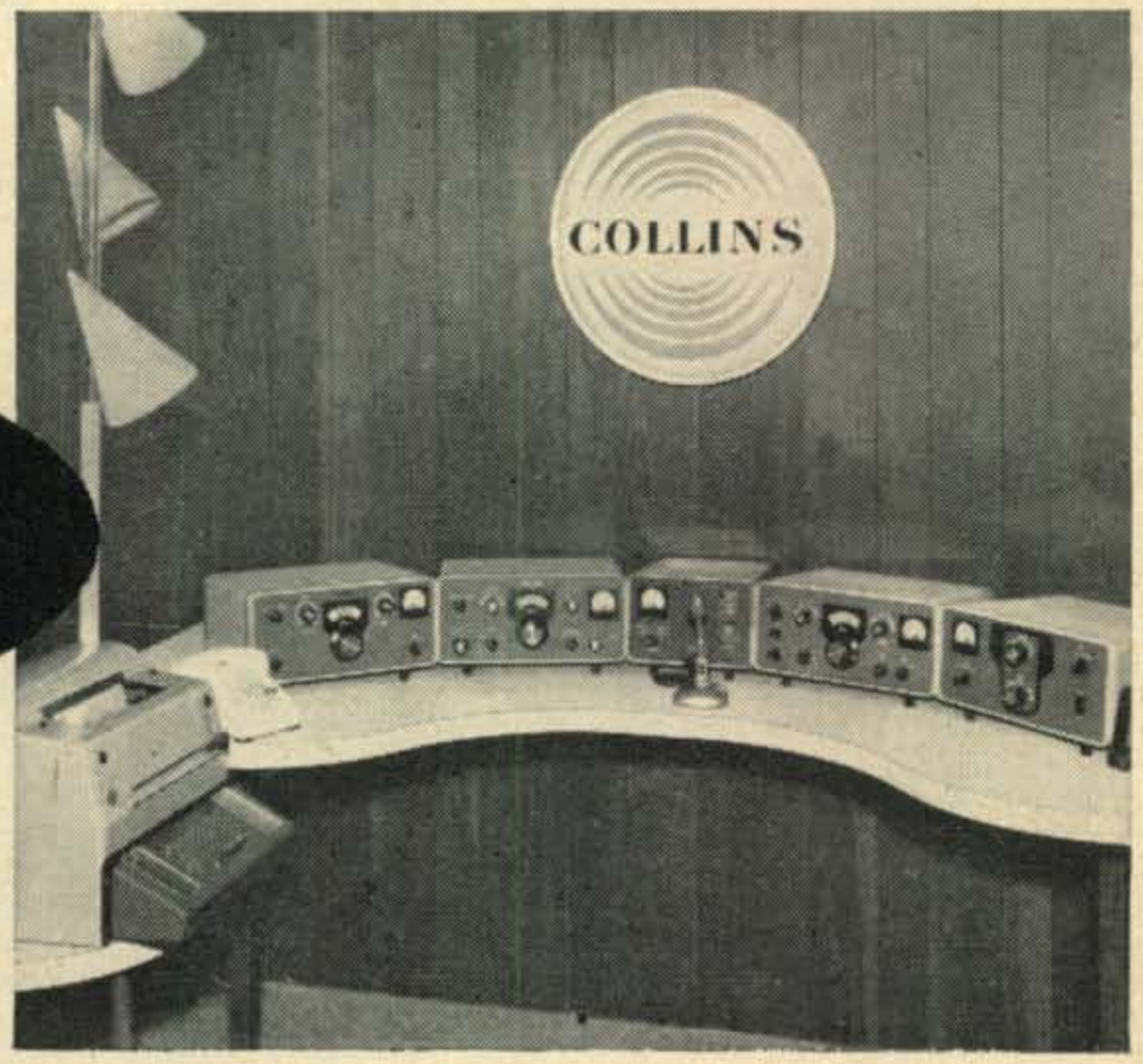
Before You Buy Collins With or Without a Trade-In Get Our Deal!

- Guaranteed Personal Service— all our male and some of our female employees are licensed active hams
- Sales and Service Personnel Collins Factory-Trained
- Full 36 months to Pay
- $5 or Your Trade is Your Down Payment
- Large Stocks Assure Immediate Shipment

DOC, W 9 H J S, manager of our Chicago store and STEVE, W 9 E A N, manager of our Milwaukee store hold daily 6 and 2 meter SSB Q S O's 90 miles apart using Collins 62S-1 SSB converters.

Working Collins displays in all our three stores. Shown here is the complete Collins station at our Chicago store.



CHICAGO HAM WINS 75S3

Here is Howard S. Wayman, W9GVA, 6760 N. Ionia Ave., Chicago, Illinois, accepting the 75S3 Receiver he won at the Big Open House held recently at Chicago Store.

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Steve W9EAN

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Saturday, 9 A.M. to 3 P.M.

Doc W9HJS

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6450 Milwaukee Ave. • Phone: Ro. 3-1030

Hours: Monday, Wednesday & Thurs., 12 P.M. to 9 P.M.
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Phil W9DVM/4

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Send all Mail Orders and Inquiries To: Terry, W9DIA at our Milwaukee store, c/o Department (C)

Get Our Quote Today, No Obligation

Terry: I want to buy_____

I have to trade_____(what's your deal?)

STAY ON THE AIR PLAN
Not only will I give you a terrific trade-in allowance, but you can keep your equipment until you receive your shipment.

Ship Me: _____

I enclose $_____ and will pay balance

☐ C.O.D. ☐ 1 Year ☐ 2 Years ☐ 3 Years (10% deposit)

If ordering on terms, please list following information on separate sheet and enclose with this order: Name, address, age, married? children? Employed by? Salary? How long? Own or Rent Home? To whom renting? or buying from? Wife employed? Own car?—who buying from? Three to five credit references. The more information you give, the faster we can approve your credit.

EVEN IF YOU'RE NOT ORDERING TODAY, SEND ABOVE INFORMATION FOR ATTRACTIVE CREDIT CARD

NAME _____

ADDRESS _____

CITY _____ STATE _____

☐ Check for latest reconditioned bulletin.

For further information, check number 51, on page 110

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1964 Catalog No. 640

422 Giant-Size Pages

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KT-390
Made in U.S.A.

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$5 Monthly

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- Built-in 3-Section Low-Pass Filter
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Scarsdale, N. Y.
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Bronx, N. Y.
542 E. Fordham Rd.
Newark, N. J.
24 Central Ave.
Paramus, N. J.
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Plainfield, N. J.
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Syosset, L.I., N.Y. 11791

Send me the FREE 1964 Lafayette Catalog No. 640.

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Address.....

City.....Zone.....State.....

For further information, check number 10, on page 110

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PLUS

Patience, Workmanship, Integrity, Experience and Know-how

It takes more than parts to produce a rig like National's NCX-3 SSB transceiver . . . It takes vital intangibles not listed on any spec sheet or schematic. **PATIENCE** to design carefully and conservatively . . . **WORKMANSHIP** assuring meticulous attention to the smallest detail of component placement and soldering . . . **INTEGRITY** to avoid fanciful claims, and to ship only fully tested, quality-approved units, backed up by a One-Year Guarantee and a nation-wide network of warranty repair stations . . . **EXPERIENCE** with every phase of the communications equipment business — from the design and manufacture of atomic frequency standards and super-sophisticated military SSB equipment to the least glamorous choke, knob, or drive . . . and just plain **KNOW-HOW** — the know-how you expect after nearly half a century of building ham equipment — know-how to put the features **you** want in a rig like the NCX-3 — complete CW coverage of the 80, 40 and 20 meter bands as well as the phone sections . . . break-in keying . . . **built-in** VOX . . . **smooth** SSB/CW AGC and product detector action . . . **built-in** S-meter . . . **built-in** AM detector for compatible AM operation . . . mobile mount at no extra charge . . . In fact, all of the features and performance you want and need for fixed station as well as mobile/portable use.

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For further information, check number 49, on page 110

RCA NUVISTOR QUICK-SELECTION CHART

RCA TYPE	CLASSIFICATION	INTENDED APPLICATIONS	RCA DARK HEATER Volts/Amp.	CHARACTERISTICS, CLASS A_1, AMPL. Amplification Factor	Transconductance μmnos	Plate ma.	MAX. RATINGS, Design—Max. Values Plate Volts	Grid Volts Neg. Bias.	Grid Volts Pos. Bias.	Cathode ma.	Plate Dissipation Watts
2CW4	High-Mμ Triode	TV, FM VHF Tuners	2.1/0.450	65	9800	7	135	55	0	15	1.5
2DS4	High-Mμ Triode*	TV, FM VHF Tuners	2.1/0.450	63	9000	6.5	135	55	0	15	1.5
6CW4	High-Mμ Triode	TV, FM VHF Tuners	6.3/0.135	65	9800	7	135	55	0	15	1.5
6DS4	High-Mμ Triode*	TV, FM VHF Tuners	6.3/0.135	63	9000	6.5	135	55	0	15	1.5
13CW4	High-Mμ Triode	Antenna-System Booster Amplifiers	13.5/0.060	65	9800	7	135	55	0	15	1.5
Types subjected to special tests and controls							MAX. RATINGS, Absolute—Max. Values				
7586	Medium-Mμ Triode	General-Purpose RF Amplifier to 400 Mc RF Oscillator to 800 Mc	6.3/0.135	35	11500	10.5	110	55	4#	15	1
7587	Double-Ended Sharp-Cutoff Tetrode	General-Purpose RF Amplifier to 250 Mc RF Oscillator to 850 Mc	6.3/0.150	—	10600	10	250	55	2#	20	2.2
7895	High-Mμ Triode	General-Purpose RF Amplifier to 400 Mc RF Oscillator to 800 Mc	6.3/0.135	64	9400	7	110	55	2#	15	1
8056	Medium-Mμ Triode	Low B+ Type (12 to 50 V) RF Amplifier to 400 Mc RF Oscillator to 800 Mc	6.3/0.135	11.5	7500	8.7	50	55	2#	15	0.45
8058	Double-Ended High-Mμ Triode	Cathode-Drive Amplifier to 1200 Mc RF Oscillator to 1200 Mc	6.3/0.135	70	12400	10	150	55	0	15	1.5

*Having special cutoff characteristic approaching that of a semi-remote cutoff tube

Peak-positive value

Which RCA Nuvistor for your Circuit?

RCA Nuvistors—actual size

This chart shows you at a glance the ratings and characteristics you will want to know when selecting nuvistors for that new high-frequency job.

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